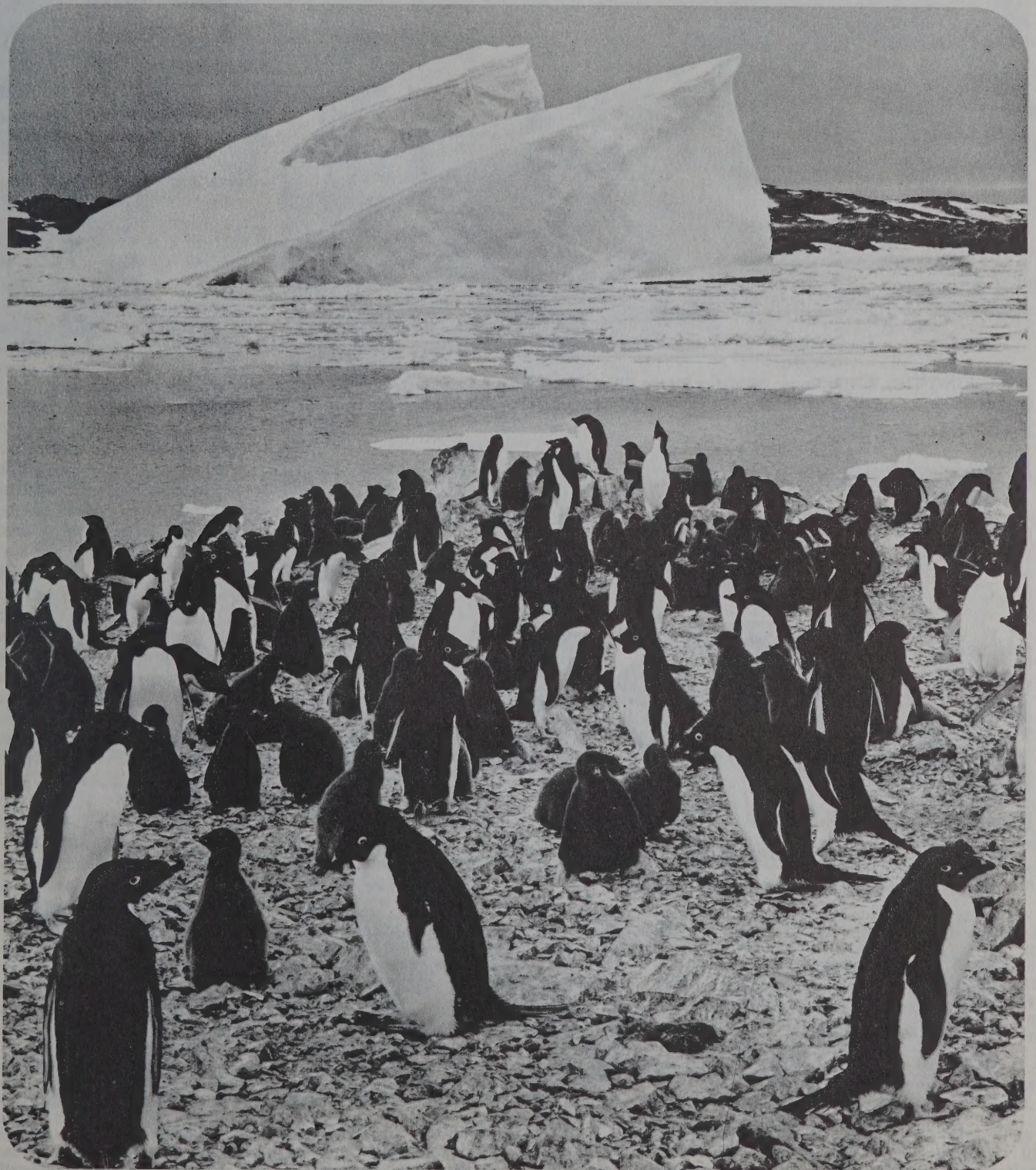
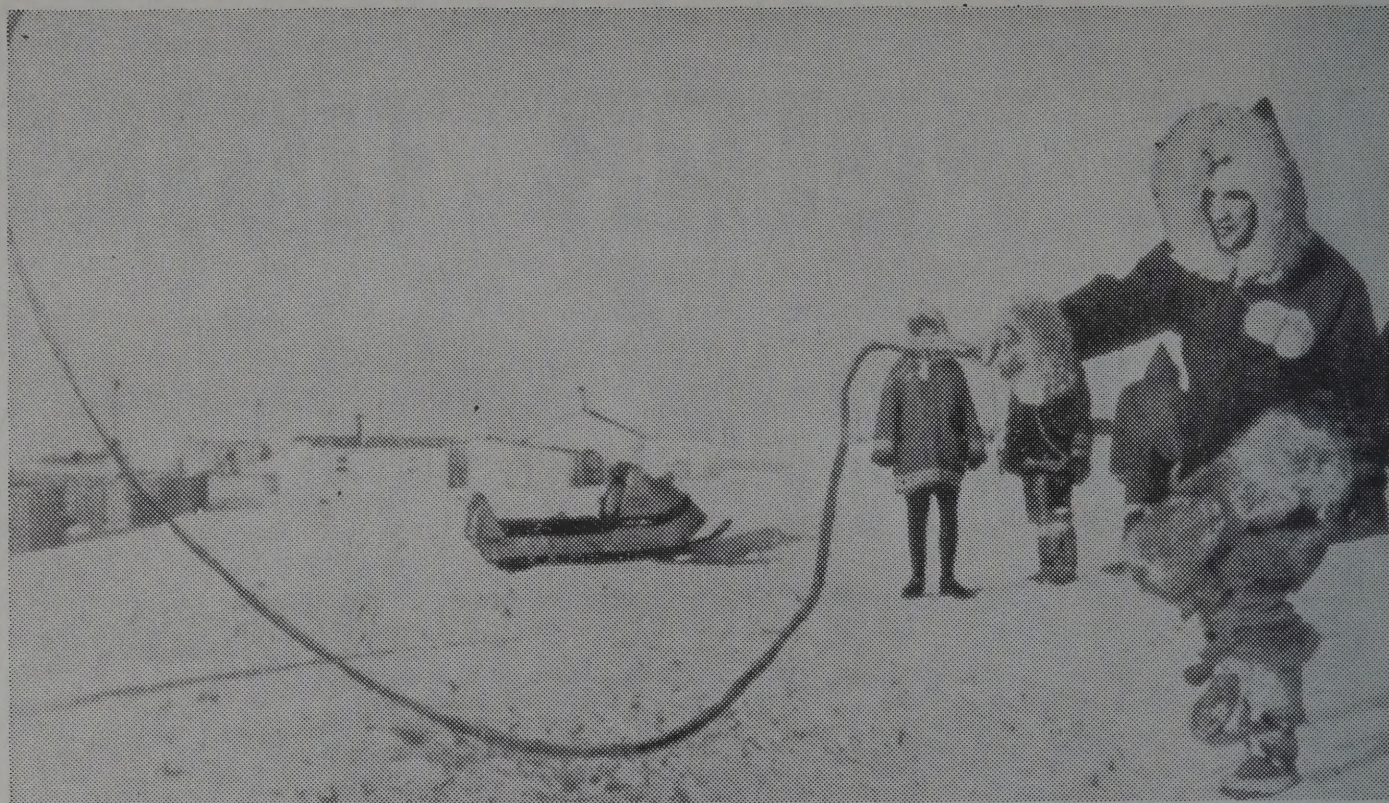


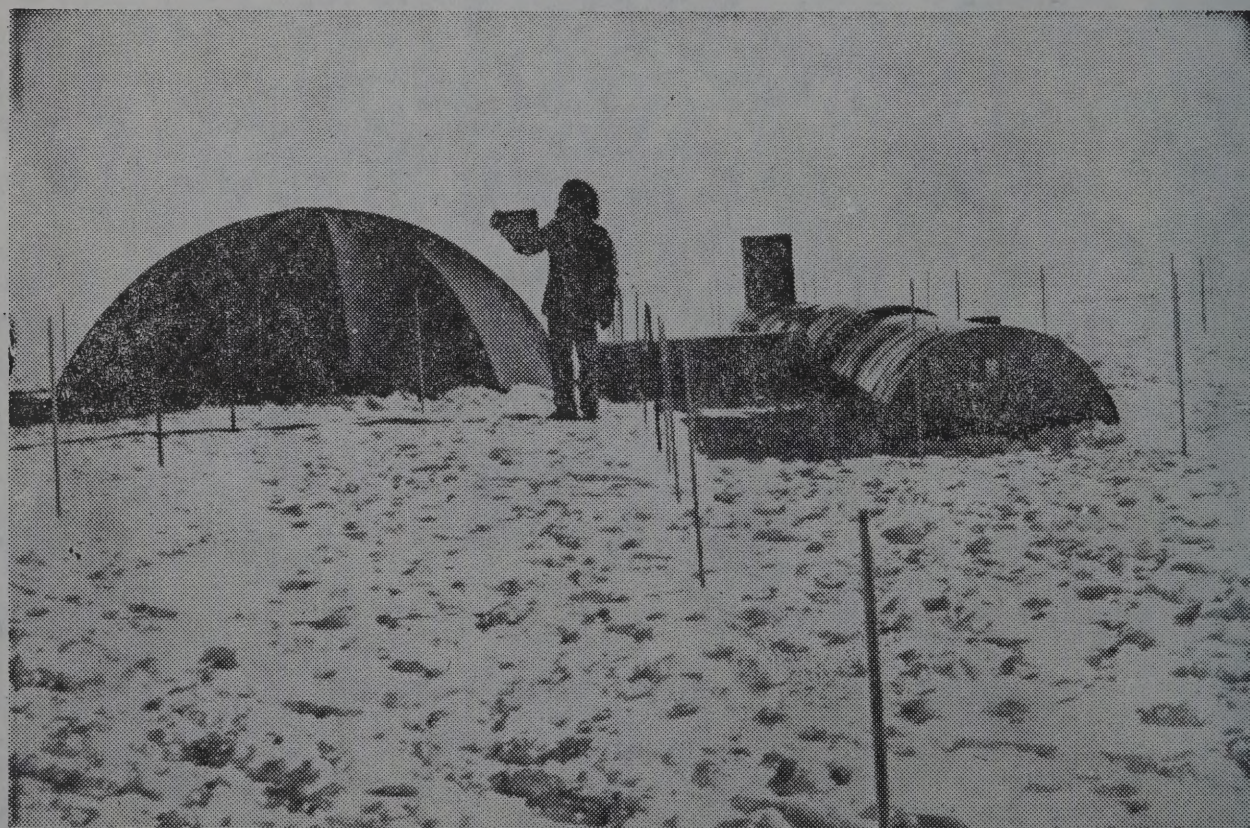
THE POLAR TIMES





United Press International

CRACKING THE WHIP: Prime Minister Pierre Elliott Trudeau of Canada trying his hand with a whip during a stop at Baker Lake, a settlement in the Northwest Territories. The Prime Minister is making a six-day tour of the Arctic.



A Naval Civil Engineering Laboratory technician looks like the Abominable Snowman as he towers over a mini-station built by the Lab at the South Pole. Scaled to one-tenth the size

of actual construction, this mock-up will enable scientists and engineers to study snowdrifts for a year before the full-scale project begins next year in the Antarctica.

The Polar Times

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No. 70

JUNE 1970

Scientists Find Ancient South Pole in the Sahara

By SANDRA BLAKFSLEE

The New York Times

April 21

A team of earth scientists, dressed in summer shorts and sun hats, searched for the South Pole recently and found it—in the middle of the Sahara.

Dr. Rhodes W. Fairbridge, professor of geology at Columbia University and a member of the team, announced the finding yesterday at a meeting of the American Geophysical Union in Washington.

The expedition, which took scientists from 11 nations to the southeastern corner of Algeria, confirmed what has long been suspected, that the South Pole of 450 million years ago has been slowly edging its way northward, by a sliding action of the earth's crust, to the point where it has arrived today, exposed beneath the desert sun. Inch by inch, the ancient South Pole has traveled a distance of 5,500 miles.

"There is no question about it," Dr. Fairbridge said in an interview. "The territory that was the earth's south polar region in the Upper Ordovician period is now the Central Sahara." The Ordovician geologic period occurred in the Paleozoic era about 500 million years ago. The Taconic mountains in northeastern North America were formed during this period.

The phenomenon of sliding land masses is called the continental drift theory. It holds that, throughout the earth's 4.5-billion-year history, a series of vast plates, or continents, have been floating over a fluid zone of molten rock about 40 to 60 miles beneath the earth's surface.

Scientists believe that the earth's axis and its magnetic poles have remained in fixed positions throughout the earth's history. So far, however, geologists have not determined the mechanism by which this drift phenomenon works.

Nevertheless, the evidence that such movements have taken place is indisputable, Dr.



The force of melting ice etched this sandstone in the Sahara, according to scientists who found it and said it showed how the South Pole of 450 million years ago moved north.

Fairbridge said.

To accumulate such evidence, the Australian-born geologist and his colleagues went to the Sahara last January. They spent a month combing the desert from an airplane and a Land Rover and digging in it with picks and shovels.

First, the flat topography showed great parallel grooves, like tractor marks, across hundreds of miles of smooth, pavement-like rock. This indicated that masses of glacial ice, which makes up polar ice caps, moved across the land.

Second, the rocks held a magnetic history. Lines of

magnetism in the rock indicates that it had once been at the South Pole rather than at the North Pole.

Moreover, the sedimentary composition of the rocks pointed to an icy past. Sandy deltas are the likely product of melting ice and soil cracks are the typical results of deep freezing.

Fossil evidence clinched the theory. Trilobites, tiny crab-like animals that disappeared millions of years ago, just after the Ordovician period, were found imbedded in the rocks. Radioactive dating of the rocks put their age at

about 450 million years.

From such evidence, the scientists concluded that the Sahara was once covered by a large body of continental ice.

Although Europe was once covered by glaciers from the North Pole, Dr. Fairbridge said the ice that covered the Sahara did not come from the north.

One reason is that the area, which includes Morocco, Mauritania, Algeria, Niger, Libya and Chad, is only 1,500 miles from the equator — too far south for a northern glacier to come with the earth's axis fixed where it is. Another reason is that the grooves in the

stone show that the glaciers moved from the south to the north.

The center of the ancient South Pole is now situated in the border pocket of Algeria, Libya and Niger. Temperatures there reach 137 degrees. Antarctic temperatures can plummet to 137 degrees below zero.

The earth looked quite different 450 million years ago than it does today, Dr. Fairbridge said. South America and Africa were probably one continent. Antarctica and Australia also were probably one continent, situated up near the Equator. Tropical coral deposits have been found in modern Antarctica.

Scientists first became curious about the flat rocky formations in the Sahara 10 years ago, when Algerian and French geologists searched for oil deposits in the desert. The recent expedition, founded by the Algerian Petroleum Institute, was made to confirm suspicions about continental drift.

Fourteen scientists, from Algeria, Brazil, Denmark, England, France, Holland, Poland, Sweden, the Soviet Union, the United States and West Germany took part in the expedition. A second American on the team was the Rev. Paul Potter of the University of Indiana.

Mark Polar Sunset

Christchurch, New Zealand, March 23 (Reuters)—Twenty-one scientists and United States Navy servicemen who will spend the winter at the Amundsen-Scott polar station in the Antarctic held a special ceremony today to mark the last sunset at the South Pole for six months. Flags of 16 nations were lowered as the sun set.

Whales Sleep at Night

YORK, England (Reuters)—Zoologists, who wanted to know what whales do after dark, tracked the movements of one at a zoo near here and came up with an obvious answer: It sleeps.

The Polar Times

Published June and December by the

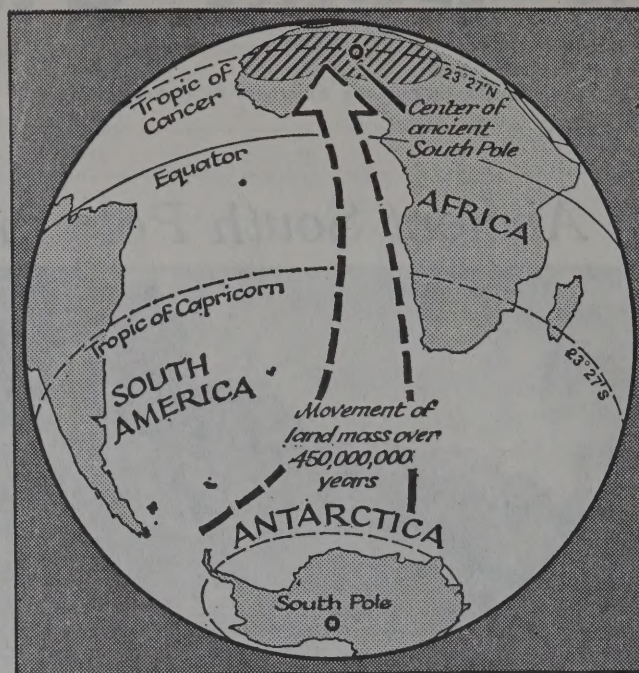
AMERICAN POLAR SOCIETY,
August Howard, Secretary,
98-20 62nd Drive (Apt. 7H),
Rego Park 74, New York.

AUGUST HOWARD, Editor

THE POLAR TIMES highly recommends "The Polar Record," published by the Scott Polar Research Institute, Cambridge, England.

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are one dollar a year, which entitles members to receive THE POLAR TIMES twice a year.

Back issues are 50 cents each.



The New York Times

April 21, 1970

Schematic view shows the shift of a portion of the earth's crust from Antarctica to the Sahara region.

Cold Antarctica Is No Frontier

BY WILLIAM HINES

World Book Service

WASHINGTON — Antarctica, the world's last frontier, is rapidly becoming a frontier no longer. It wasn't discovered until about 1820, its remote South Pole was not reached until 1912, and until 1957 there were periods years long when it was utterly empty of human beings.

But with the International Geophysical Year of 1957-58, the last frontier gave way to colonization by scientists, and the Antarctic became what author Richard Lewis has called "a continent for science." Permanent settlements now dot the continent, not only around its partly ice-free rim, but in the intensely cold, high, ice-clogged interior.

That's not all. A few years ago cruise ships started touching at points on the northward-jutting Palmer Peninsula near South America. For \$3,000 or so a place-dropping traveler could say, "When I was in the Antarctic..." In 1968 tourist vessels began calling at McMurdo Sound, the main U.S. base only 800 miles from the pole.

This year the Antarctic has fallen to the private airplane pilot, which means that its credentials as a frontier are badly damaged. The National Science Foundation's "Antarctic Journal" reports that twice in one month, light planes reached the isolated continent.

The first was a twin-engine Piper Aztec piloted by Max Conrad, the "Flying Grandfather," who tried without success in 1969 to reach the southern ice. Conrad landed at McMurdo on Jan. 12 after a 2,200-mile flight from Invercargill, New Zealand, and reached the South Pole six days later. He crashed on take-off Jan. 23, but without serious injury to himself.

On Jan. 18 — the same day Conrad reached the pole, another light plane arrived, making the bottom of the world a veritable hive of general aviation activity. It was a twin-engine Cessna flown by two Norwegians, who stayed at the Pole for three days after a flight from New Zealand via McMurdo. They then flew back to McMurdo and on to Punta Arenas, Chile.

"Such private ventures are charged for fuel and other services," Antarctica Journal explains

South Pole Relocated With Marker

WASHINGTON (UPI) —The location of the South Pole in the drifting Antarctic ice has been precisely marked for the first time in 12 years.

The new marker, a six-foot wooden post, was planted by Larry L. Amos and Thomas E. Spring of the U.S. Geological Survey at the request of the National Science Foundation.

The previous marker had shifted about 800 feet from the pole's true position since it was placed in the 9,000-foot thick ice cap in 1957.

Amos and Spring calculated the pole's exact location by sighting their instruments on 18 bright stars that appear fixed in the sky in relation to the earth's axis.

It is necessary to change South Pole markers from time to time because the ice in which they are planted is steadily drifting toward the sea.

The new marker was required for a new South Pole scientific base which must be built to replace the one now being crushed under many feet of accumulated ice and snow.

South Pole markers, because of the thickness of the ice cap, cannot be permanent. There is no way to anchor them to bedrock.

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Antarctica had long been an all-male stronghold, until an expedition of lady scientists and a journalist went to the "end of the world"

By **ARTURO F. GONZALEZ, Jr.**

"NO WOMEN!" shouted Rear Adm. J. Lloyd Abbott, Jr., U.S.N., the previous commandant of Operation Deep Freeze in Antarctica at the South Pole.

But his stringent command barely had time to lose its echo in the -50-degree frozen wilderness before five female scientists and a lady journalist jumped off the back ramp of a military transport plane and set foot on the 9,200 feet of snow and frozen turf that cover the South Pole.

Leader of the icy expedition was Dr. Lois M. Jones of the Institute of Polar Studies at Ohio State and more recently the University of Georgia. She was anxious to study rock weathering and salt accumulation in Antarctica, and she just got tired of begging male scientists who went there for rock samples. So she applied to the National Science Foundation to go to Antarctica—only to receive the traditional "no."

But Doctor Jones' determination led her to the Pentagon, where she got the backing she needed for the expedition. The only stipulation was that the party had to be all female since Antarctic living conditions and sanitary facilities were not set up on a co-ed basis.

The first to sign up after Doctor Jones was Eileen McSaveny, a graduate student in geology. Mrs. Kay Lindsay, an entomologist, joined to look for life forms in that area. The baby of the group was Terry Lee Tickhill, a 19-year-old from Ohio who was studying geology in college.

Joining the four ladies of Doctor Jones' expedition were Mrs. Peter Jones, a scientist from New Zealand, and Mrs. Jean Pearson, a science writer for a Detroit newspaper.

The ladies' trek into Antarctica took them from Washington, D.C., via Navy plane to Hawaii and on to

Christchurch, New Zealand, before landing at McMurdo Station, where they were outfitted appropriately.

From here, the ladies got the chance to take a quick side trip on a Navy daily supply mission to the South



U.S. Navy Photo

The first women to visit the South Pole photographed shortly after their arrival by plane from McMurdo. They are, from left to right: Mrs. Pam Young, Mrs. Jean Pearson, Miss Terry Lee Tickhill, Dr. Lois Jones, Mrs. Eileen McSaveny, and Mrs. Kay Lindsay.

Pole before they were eventually helicoptered out and dropped in the wilderness to fend for themselves for 90 days.

At the pole, passengers usually climb out of the plane one by one through a hatch aft of the cockpit, but the Navy feared the women might get competitive about who put the first female foot on South Pole "soil." So they solved the problem by plopping them down all together on a ramp. Arm in arm, with Operation Deep Freeze's current commander, Rear Adm. David F. Welch, the ladies invaded the Pole.

The party walked 200 yards up hill to be photographed at the Pole, where a mirror-ball-topped "candy cane" is stuck in the snow with a sign identifying that as latitude 90 degrees south. Admiral Welch walked the women around the Pole, which meant that they were going around the world in just five seconds, and at the same time they had walked from one day into the next and back

Byrd's Widow Celebrates 81st Birthday

BOSTON May 18 (AP) Mrs. Richard E. Byrd, widow of the famed explorer who was the first man to fly over both poles, celebrated her 81st birthday Sunday.

Mrs. Byrd remains active at her home on Brimmer Street, at the foot of Beacon Hill, where Adm. Byrd had his office.

Lone Woman on Whaleship Is Crew's English Teacher

PERTH, Australia (Reuters) —What can a woman do on board a whaling vessel with 35 men in the Antarctic for six months?

Teach them English.

Mrs. P. Svellana, librarian and interpreter aboard the 240-ton Soviet whaler Vorstorzen, reported on her teaching experiences when the ship called here to load supplies.

The ship is crewed mostly by cadets. Mrs. Svellana said the trip from Vladivostok had been most successful, although they had encountered very stormy seas.

Reprinted with permission of

Family Weekly, February 22, 1970

again in the same amount of time.

At the under-ice lounge, appropriately called "Club 90," the women and hosts defrosted in comfortable quarters complete with books, movies, and pool table. On the walls of the crew's lounge are hung Antarctic memorabilia including a framed sweater of Adm. Richard E. Byrd. Here the lady scientists contributed now historic tubes of lipstick and bobby pins to the collection of those who had attained a "first" at the frozen South Pole.

After getting commemorative envelopes and taking a tour of the under-ice base, the ladies climbed back into their plane and were gone. A few days later, the gals were bucking 50-mph winds and spending nights in sleeping bags and doing their scientific thing on the ice. ♦

RESORT PLANNED FOR ANTARCTICA

Luxury Hotel to Be Built
on Ross Ice Shelf

McMURDO SOUND, Antarctica (Reuters)—There are no palm trees; no sandy beaches, no golf courses—and the swimming is a bit chilly—but this white continent has hopes of turning itself into the world's most unusual tourist resort.

At the moment, there is little to attract even the most jaded traveler—what little development has taken place has been for the purpose of scientific research—but New Zealand pioneers on the Ross Ice Shelf hope to change this soon.

The first step will be a luxury hotel to accommodate up to 90 luxury-class tourists. A report issued by the New Zealand Transport Ministry said such a hotel must be built before commercial flights could begin to serve Antarctica.

The proposed hotel, including most of the amenities found in swank establishments from Jamaica to St. Moritz, will stand on the Ross Shelf itself, 14 miles from the main American research base at McMurdo Sound.

The transportation ministry says an airport terminal building must be erected as well, and aircraft must carry sufficient fuel to return to New Zealand should the runway become unusable.

This part of the development will be up to Air New Zealand, the country's national airline, according to the ministry.

The runway to be used would be at outer Williams Field, some distance from McMurdo Sound, because a closer runway is built on annual ice with insufficient load strength for flights in January and February—mid-summer in this part of the world.

What will the intrepid tourist find after flying all the way to the bottom of the world?

For one thing, McMurdo itself, no longer just a "station" or "base," but a thriving community of more than 1,000 people.

In the summer, it is a dry, dusty, American frontier town, with saloons containing full-length nudes in the best Wild West tradition.

McMurdo considers New Zealand's nearby Scott Base as

Lived With Soviets At Antarctic Post

By H. LeROY SCHARON, Ph.D.
For Enterprise Science Service

Dr. Scharon, professor of earth sciences at Washington University in St. Louis, spent 16 months as the only American at a Soviet scientific station in Antarctica.

Antarctica, a continent of some five million square miles covered with an ice shield seven million cubic miles in volume, has taken diabolic delight in pitting its hostile environment against man's aspirations to conquer its vastness.

But it is there, in spite of Antarctica's lack of co-operation, that men of all nations may move freely, exchange ideas and hopes and desires, and work together in international scientific investigation.

I had joined the Soviet Union's 13th Antarctic Expedition at Dakar, Senegal, in late November 1967, to carry out scientific

investigations of the geomagnetic field both of the present and of the ancient past. From Dakar, we progressed southward aboard the Soviet oceanographic vessel Professor Viese, one of seven identical ships built in East Germany a year earlier.

During 16 months I spent in Antarctica, I worked with scientists and engineers in many disciplines involving geophysics, upper atmosphere research, and biological and medical investigations. Life and fellowship with these men, as well as with many construction workers of various trades, was a tremendous experience.

Sixteen months in Antarctica could drag on interminably, but the work was fascinating, the surrounding country was a source of endless interest, and my colleagues were a fun-loving, humorous, musical group that made the time fly.

They made spirited mental

Fuji Breaks Away Into Open Waters

Japan Times, Tokyo

March 20
The icebreaker Fuji, which had been stranded in an Antarctic ice field after losing one of its twin propellers late last month, finally broke away into open waters under its own power Thursday morning (JST).

Long-awaited winds from the south suddenly loosened the three-meter-thick icepacks surrounding the expedition ship. The 7,760-ton Fuji pushed her way for 50 kilometers through the floating ice, finally freeing herself at 5:43 a.m. Thursday (JST), she reported to the headquarters in the Education Ministry.

A report from the Fuji received by the Antarctic Ob-

merely a suburb on the seven-mile road to Williams Airfield, but Scott's cozy intimacy reflects an entirely different approach to living.

Somehow the Kiwis manage to make their accommodations much more livable and human than the Americans.

servation Promotion Headquarters in the Education Ministry in the afternoon said the ship had suffered no damage while ice-bound except for the broken screw.

The ship is heading toward Capetown instead of Fremantle in Australia and will call off a scheduled stop at Colombo, the report said.

The chief engineer of the ship said there were some doubts over whether the Fuji could make a 18,000-km trip back to Tokyo without hitch.

The Fuji had been stranded amid deep ice formations since Feb. 25 at a point 58 kilometers north of the Japanese Showa Base on Ongul Island after one of her propellers was torn away.

The U.S. icebreaker Edisto had been heading for the area off the Showa Base with relief goods.

The area around the Japanese base is said to be hardest of access among the Antarctic bases because the waters there are covered with both stationary and floating masses of ice.

battles of chess games and drove dominoes onto the playing tables with loud snaps and boisterous laughter. Just to watch their hard play was relaxing, as was their singing of folk music and war songs to the accompaniment of the accordion or the balalaika.

We spent most of February on the western end of King George Island in the Antarctic Peninsula. Here the Soviets established a new scientific base, Bellingshausen, named after a famous Russian explorer who sailed into the Antarctic seas and discovered land in 1817. In one month the station was completed, including the construction of a diesel-electric power station, a small hospital, a radio-restaurant-headquarters building, a meteorological complex, and laundry and bath facilities.

The men worked with a minimum of simple tools, usually just axes and saws. Holes, instead of being drilled into the foundation logs, were burned through with heated iron rods. To measure distances, Soviet safety matches (exactly three centimeters long) substituted for rulers.

Whaling Chart From 1851 Reproduced Just as It Was

WASHINGTON — An 1851 chart telling seamen, especially whalers, where they could expect to find whales has been reproduced in its original form by the United States Naval Oceanographic Office.

The chart was originally published by the United States Hydrographic Office, the forerunner of the Oceanographic Office, under the auspices of its commander, Matthew Fontaine Maury.

Retaining all the original symbols and type faces, the reprinted chart, like the original one, is black and white, and features drawings of spouting whales. These drawings locate the huge mammals as they were spotted in the 1850's by mariners traversing the world's oceans.

The chart, known as H.O. Miscel No. 8514, is available for 50 cents from the United States Naval Oceanographic Office, Chart Sales Desk, Suitland, Md. 20390.

New South Pole Base

Wellington, New Zealand, Jan. 30 (Reuters) — The Soviet Union announced today it had established a new station in Antarctica, it was reported from Scott base. The new station is the sixth Russian base now activated on the continent and is approximately 200 miles from Hallett, the joint New Zealand-United States station.

'Historic Sites' in Antarctica

Melbourne Australia is making plans to insure the preservation of historic remains and relics in Antarctica.

Among the memorials to be made permanent are the graves of seven Russians and a German, members of the Soviet antarctic expedition who died in a fire on Buromskiy Island in August 1960.

The eight lonely graves will be evidence of the large historic facts of Antarctica—the frozen continent has been the scene of one of the most successful experiments in international collaboration.

A treaty signed in 1959 by 11 nations provided for complete freedom of access of scientific expeditions to any part of the antarctic continent for interchange of scientific information and personnel.

Under the treaty's terms no military activities of any kind may be carried on, and a system of inspection by national observers insures that the provision is not evaded.

Vast Area

The Australian Antarctic Territory has an area of about 2.4 million square miles, a little less than the combined area of the United States and Australia.

Antarctica's climate is the coldest

and harshest in the world. At the coast the mean annual temperature is zero Fahrenheit; 400 miles inland it is minus 30 and 900 miles inland, minus 60.

The intense cold is aggravated by strong winds which sometimes blow with extreme violence.

Antarctica has stirred the interest of scientists and explorers from many countries. Many Australians have been among them.

The most famous of the Australian explorers was Sir Douglas Mawson, who was a member of Sir Ernest Shackleton's first expedition to Antarctica, in 1907. Mawson joined the party as a physicist. He made the first journey to the South Magnetic Pole area, a journey which ranks among the greatest in polar history.

After his return to Australia Mawson took his doctorate of science and a year later began planning an Australian expedition to the 2,000 miles of unknown antarctic coastline between Cape Adare and Gaussberg.

The expedition sailed for Antarctica in 1911, charted over 700 miles of new coastline for the first time and penetrated 250 miles inland. The party established bases in King George V Land, Queen Mary Land and Macquarie

Island before returning to Australia in 1914.

Fifteen years later, in 1929-31, Mawson led a combined British, Australian and New Zealander antarctic research expedition. British sovereignty was proclaimed at seven localities and, two years after the expedition returned, the Australian Antarctic Territory was established.

To preserve in perpetuity many of the historic objects in Australian Antarctic Territory, the Australian government's Antarctic Division of the Department of Supply is planning to restore many of them.

One is the hut built by Mawson at Cape Denison, King George V Land, in 1912 while he was with the British expedition led by Shackleton.

Another is the cross and plaque erected to the memory of Mertz and Ninnis, two members of the Shackleton expedition who died at Cape Denison in 1913.

Other restorations are planned of the records of landing by Australian explorer Sir Hubert Wilkins at Walkabout Rocks on Jan. 11, 1939. Wilkins had led a private expedition in 1928 to Graham Land and made the first airplane flight in the antarctic.

The foregoing was released by the Australian government's News and Information Bureau in New York.

Polar 'Operation Snowdrift'

The scene at the South Pole seemed incongruous. A group of men was putting up miniature model buildings (the top of some reaching their knees) in temperatures 40 degrees below zero.

But they weren't playing. They were as serious as they were cold. They were engineers and technicians from the Naval Civil Engineering Laboratory, Port Hueneme, involved in an important task; a prelude to actual construction of a vital new scientific station in Antarctica.

Scaled to one-tenth size, the model consisted of a geodesic dome, 5.2 feet high, and about 65 feet of arches, two feet tall. Based on preliminary tests in NCEL's wind tunnel, construction took place half mile from the Pole. The purpose? To study snowdrift patterns aimed at minimizing drift problems when the actual station is built, starting next year.

The model will be exposed

to the elements for a year, until October, when NCEL returns to study the results of dome and tunnel positioning. Snow accumulation around the structures will represent 10 years of piling (drift) around and over the real size station, according to Frank W. Brier, 3025 Seahorse Ave., Ventura, project engineer.

Navy Seabees built the present scientific station 14 years ago. Since then, drifting and snow have buried the installation and are gradually crushing it. The slow but steady movement of the polar ice cap (about 250 feet per year toward South America) has moved the station approximately a half mile from the Pole.

The National Science Foundation program for the new station will include meteorology, atmospheric physics, seismology, gravity and human physiology.

The Naval Facilities Engineering Command (NAVFAC),

in charge of design, selected a first for Antarctica, the geodesic dome. Inside the dome will be three buildings for quarters and operations, two of them two stories high.

The dome, 164 feet in diameter and 50 feet high, will be fabricated of an aluminum skin over a framework of extruded aluminum sections. Acting as an umbrella, it is designed to keep snow away from inner structures. Connected to the dome, by a covered passageway, will be a 52-foot tower with a sky laboratory at the top.

Crosswind from the dome will be four buildings resembling Quonset huts. The protective arches will shield shops, supplies, vehicles, fuel and machinery from snowdrift.

The dome was chosen from among a dozen concepts because it offers the optimum size to accommodate inner structures; it is expected to be comparatively easy to erect and

its shape is expected to retard accumulation of drifted snow.

NCEL geologist R. A. Paige, 1400 North M St., Oxnard, laid out the campsite after which W. A. Walker, 1361 Hibiscus St., Oxnard, and C. W. Henderson, 992 Baldwin Road, Ojai, constructed the mini-station.

They are members of NCEL's Polar Division which was formed in 1958 and has developed into an international leader in arctic research and development. Since 1965, more than 30 Laboratory developments have been placed into operation by the Naval Support Forces in the Antarctica.

Whale Blubber for Sale

NOME, Alaska (AP)—A grocery advertisement in The Nome Nugget listed four items under "quality meats." They included fresh-frozen black muktuk (whale blubber) and reindeer stew.

Old Whale Fossil Found

Belgrade, Oct. 11 (Reuters)—The fossil skeleton of a whale, estimated to be 26 million years old, has been found near the town of Derventa, midway between here and Zagreb, authorities said today.

STUDY OF WHALES IS MADE BY SONAR

Mammals Are Tracked for
Experiment of Echoes

WASHINGTON—Two marine biologists, working for the United States Naval Oceanographic Office aboard a destroyer, visually identified sonar "echoes" received in Atlantic waters as a whale.

"This was one of those rare incidents," said William T. Leapley, a marine biologist, "the first time we have been able to verify a sonarman's classification of an 'echo' as a whale sonar target by first actually tracking the source of the contact and then by visually identifying it as a whale—in this instance, a group of five finback whales."

Mr. Leapley and his associate marine biologist, Coleman Levenson, had just completed an investigation into biological sonar targets aboard the U.S.S. Basilone, a navy destroyer, when sound signals indicating possible whales in the area were received.

"At that time, we were off Cape May, steaming toward Newport, Rhode Island, the Basilone's home port," Mr. Leapley recalled. "Prior to this, the sonarman aboard the ship had reported what they thought were the 'echoes' of sound signals bouncing off the bodies of whales, but we had yet to confirm any of these reports through visual identifications of the 'echo' sources."

"So when a sailor awakened me just before dawn on a summer morning to report a whale off the ship's starboard side, I thought that this might be the sighting we had been hoping for," he remembered. "After dashing up to the bridge to have a look, I learned that the 'sighting' was just another sonar contact classified 'probable whale' by the senior sonarman."

"I was about to write it off as a frustrating near miss when Cole [Mr. Levenson] arrived on the scene with the suggestion that we try to track this target down and really get some proof of its identity."

So the ship headed back to the spot where the sonarman first picked up the whale contact. Then, dead-ahead, the marine biologists saw "this great long form stretching out in the path of the ship."

"And, there lying near our ship," Mr. Leapley recalled, "were two huge finback whales, 65- to 75-foot specimens that had just surfaced."

Mr. Leapley then explained

Lindbergh warns against whale overkill

By Reuters

Tokyo

Aviation pioneer Charles A. Lindbergh has warned that blue and humpback whales in the Pacific are in danger of extinction through overkilling.

Mr. Lindbergh, who made the first nonstop transatlantic flight in 1927, now is an ardent conservationist, and a consultant for the Oceanic Foundation of Honolulu.

He told newsmen, "the whale is symbolic. . . . If we can rebuild whaling resources it is a major step to rebuilding other marine resources."

"Conservation and exploitation go right together. We should try to get the maximum yield of ocean resources for future food when the world population is growing. To do that we need conservation programs," he said.

that he and Mr. Levenson were able to identify the two whales as finbacks by noting the physical characteristics of the two ocean mammals.

Almost as soon as the marine biologists spotted the two adult finbacks, the captain, Comdr. H. S. Keller, began to maneuver the destroyer in a tight circle around them.

"About halfway around, the whales dove," Mr. Leapley asserted. "Then, about five minutes later, they surfaced again. At about the same time, we noticed that two more adults and a juvenile had also surfaced approximately 100 yards

3 Main Whaling Countries Will Keep Antarctic Quota

The New York Times

LONDON, June 30—Representatives of Japan, Norway and the Soviet Union, the three main whaling countries, have agreed here to maintain the present catch limit of 2,700 whale units for the Antarctic.

A proposal for a smaller quota was pressed by the United States and other countries represented at an international conference to conserve the vanishing whales that ended here yesterday, but the proposal was blocked by Japan.

The three countries will recommend to their Governments quotas that would allocate the permitted catch for the 1970-71 season as: for Japan, 1,493 blue whale units; for Norway, 231, and for the Soviet Union, 976. If the proposal is endorsed, the agreement will be signed in Tokyo July 21.

Under a complex scale adopted by the International Whaling Committee, a blue whale unit equals two fin whales or six sei whales. The quota of 2,700 whale units for the Antarctic could mean 5,400 fin whales, which weigh about 110 tons, or 16,200 sei whales, the 50-ton species, or any combination.

away."

During the 45 minutes the scientists maintained visual contact with the five whales, the ship's sonarman were busy tape-recording echoes bounced off the mammals' bodies on equipment connected to the ship's sonar.

"The tape containing the sounds now definitely determined to be whale echoes," Mr. Leapley said, "will be analyzed further to learn what a whale looks like on sonar equipment. Results of this analysis," he added, "will eventually help the navy to classify the mammals."

Medal for explorer

LONDON, March 2

Mr. Walter Herbert, the Arctic explorer, who led the recent record breaking 16-month trek over the Arctic ice cap, has been awarded the Royal Geographical Society's Founder's Medal "for Arctic and Antarctic exploration and surveys".

His four-man expedition was the first to make a surface crossing of the Arctic, a trek of 3,800 miles over drifting ice. Their walk ended last May.

Negro Explorer Of Pole Honored In City Ceremony

April 7

One of the first men to walk on the moon paid tribute yesterday to Matthew A. Henson, the Negro explorer, who, in Admiral Robert E. Peary's expedition, was one of the first men to set foot on the North Pole on April 6, 1909.

Capt. Charles Conrad Jr., commander of the Apollo 12 space mission last November was a guest speaker at a ceremony attended by 500 people outside Dunbar Apartments, 2588 Seventh Avenue in Harlem, where Mr. Henson lived from 1928 until his death in 1955 at the age of 89.

"I'm sure it was a proud moment for Henson when they placed the flag on the North Pole, just as it was a proud moment for us when we placed the flag on the moon," Captain Conrad said.

Comparing the two adventures, Captain Conrad noted that the last leg of the Arctic trip involved four days of extreme physical discomfort and had "all the uncertainties of going to an uncharted region."

By contrast, he said, the moon trip was undertaken in relative comfort, guided by electronic gear.

Shortly before noon, a bronze plaque was unveiled at an entrance to the block-square apartment complex at 150th Street. The plaque bears a likeness of Mr. Henson, who began his great adventure as a cabin boy on a schooner bound for China.

Following the ceremony, Captain Conrad predicted that women and foreign nationals as well as black men would be on American missions in the future.

Antarctic tourism mullied

Wellington, N.Z.

Confidence that tourism will develop in Antarctica is expressed by the new commander of the United States naval Antarctic support force, Rear Adm. D. F. Welch.

But he does not think the United States Government will be interested in financing a tourist trade to the region.

Admiral Welch was interviewed while here to meet government leaders and officers connected with the Antarctic program.

He said tourism in Antarctica was likely to be developed only by a commercial concern. He did not think tourism would affect the scientific work being carried out.

Scientists Call for Stiffer Controls on Whale Hunting

By **BERNARD WEINRAUB**

The New York Times

LONDON, June 23 — An international scientific committee urged today that further restrictions be placed on whale hunting, including a reduction in catch quotas.

In a report to the 15-nation International Whaling Commission, now meeting here to discuss measures to protect whales from threatened extinction, the scientists warned of dangers facing the whales throughout the world.

"Some stocks in the Southern Hemisphere show signs of depletion," the report of the scientific committee, representing the United States, the Soviet Union and five other countries, said. "In the Northern Pacific," it said, "male sperm-whale stock has apparently now reached a level at which there is little or no further surplus and it is desirable to slow down the decrease of male stock in view of apparent excessive catches."

Soon after the war, an international agreement placed a ceiling on the total number of "blue-whale units" that could be caught in the Antarctic by ocean-going whaling fleets.

The units are the whaling commission's scale for measuring catches. One blue-whale unit now equals two fin or six sei whales. Therefore, the current limit of 2,700 whale units for the Antarctic means a quota of 5,400 fin whales, which weigh about 110 tons, or 16,200

sei whales, the smaller, 50-ton species.

At present the commission has imposed a total catch limit of 2,700 whale units for the Antarctic—the main breeding grounds for whales. The United States and several other countries are believed pressing for a further reduction, possibly to 2,500 whale units, although this is opposed by Japan, a key whaling country.

Thirty years ago, there were nearly 100,000 blue whales. These are the largest whales, as long as 100 feet and weighing as much as 130 tons. Today, there are fewer than 3,000 blue whales.

During the 1950's there were nearly two dozen factory ships that converted whales to meat and oil. Today there are only six factory ships, with the Soviet Union and Japan emerging since World War II as the two major whale-hunting countries.

"There is, of course, a danger of extinction and that's what we're trying to prevent," said the chairman of the five-man American delegation, Dr. J. L. McHugh of the National Science Foundation who is chief of the office for the International Decade of Ocean Exploration.

"The essential problem is how large a harvest can safely be taken without affecting the whale's capacity to reproduce," he said, during a break in the 22d annual Whaling Commission meeting in River Walk House, a Government of-

fice building overlooking the Thames.

"In every animal, nature invariably produces a surplus," he went on. "This surplus is balanced through death — there's an equilibrium — and the problem for man now is harvesting this surplus of whales, a surplus that would otherwise die off, without harming the whales' capacity to reproduce."

"Man is, after all, just another predator," he said.

The other nations represented at the week-long whaling conference are Argentina, Australia, Britain, Canada, Denmark, France, Iceland, Mexico, the Netherlands, Norway, Panama and South Africa. It has closed its doors to the public for discussions on two key items: the 1970-71 whale catch quota in the Antarctic and a series of delicate proposals for international observer teams to insure that whalers keep to their quotas.

The proposals have been discussed for a decade but both the Soviet Union and Japan remain cool to this effort.

"Neither side wants the other to see their whaling operations," said one observer close to the conference. "The Russians don't want Japanese observers on their ships, while the Japanese don't want Russians on shore stations along the Japanese coast."

In the technical report today, the scientists discussed the status of numerous whale spe-

cies, ranging from the great blue and humpbacked whales, with their reservoirs of meat and oil, to the smaller sei and fin whales, which are now the prime target for ocean fleets.

With the killing of blue and humpbacked whales banned in recent years, the committee recommended a three-year extension of the restriction, starting in 1971.

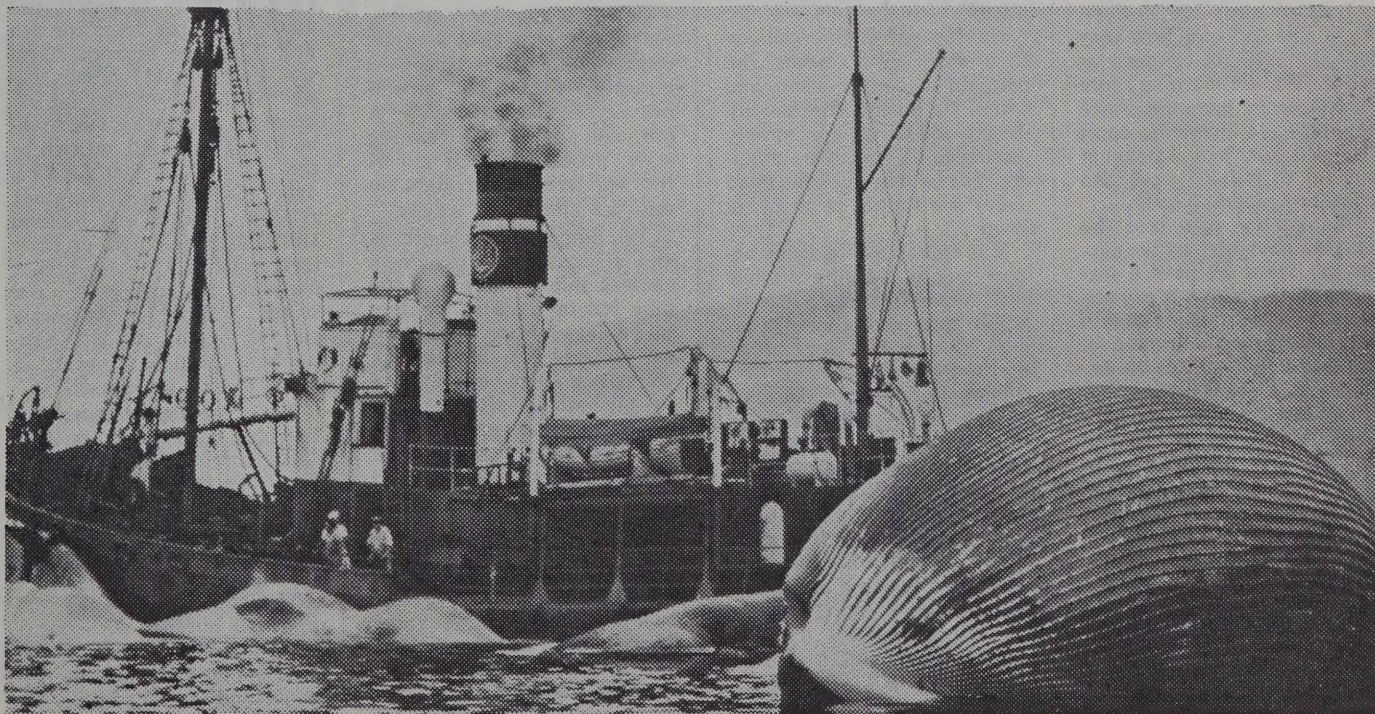
In dealing with other whales, however, the report indicated a division between Japan and other countries, including the United States, which killed fewer than 200 whales last year, mostly off San Francisco. Ten years ago the United States catch reached 400.

Generally, the Japanese have pressed for lighter restrictions. "All members except Japan agreed that the recent level of fin-whale catch in the Antarctic [2,700] appears fairly close to the present sustainable yield," the scientific committee told the conference.

"Japanese scientists believe the best estimate for 1970-71 is 3,520 to 4,350," the report said.

The decline of whales began even before World War II, when Norway was the major international whaler. Through the war years, however, there was little hunting in the Antarctic, and the decline eased.

But whales are not rapid breeders. The females have calves only every two and a half years or so. It is recognized that unrestricted catches would soon eliminate whales.



Sperm whale being hauled in by hunting vessel in the Antarctic. Catch quotas are proposed to prevent extinction.

Amazing Bird in Dinner Jacket

By Arville Schaleben

Milwaukee Journal

McMurdo, Antarctica

The penguin looks like us in dinner jackets but does many things better than we do so we're studying him hard.

For example, he can drink seawater and blow the salt out his nose. No other warm blooded animal can do the same. If we can learn the trick and then copy it with a machine, we can ease fresh water problems worldwide — maybe.

The penguin does it with a gland in his nose that is 10 times more efficient in separating salt and water than kidneys like ours. He has regular kidneys, too, as all us vertebrates do. Those do the bodily functions after his super-nose "kidneys" have desalinized water that would kill us.

Each year field scientists headquartered out of United States and other bases in the Antarctic band hundreds of penguins. Put on when the penguins are chicks, the bands tell us how long it takes them to grow up, whether they are faithful to their mates (they are, after a fashion, equivalent to man) and whether they return to their nests each year (they do, and the same cannot be said of some of us).

Lots of birds are homers. We'd like to know how they navigate without compass or radar. We are learning more readily from penguins since penguins are birds that can't fly. You can take a penguin out on to the ice pack and track him plodding back.

We know now that the penguin navigates by the sun. So can we if we have a sextant and timepiece. Many scientists consider the penguin the most primitive bird alive. But certainly he needs no visible sextant or chronometer.

Richard Lee Penney, then of the University of Wisconsin zoology department, in 1960 flew five male penguins 1,500 miles from his Wilkes scientific station and released them near here. Three of them returned to Wilkes just in time for the next breeding season and the other two died in the attempt.

If we could do that well, we'd have a chance against the next ice age, for these

penguins are surviving conditions as hostile as Wisconsin in its glacial periods.

One of the highlights of any visit to the Antarctic is seeing the penguins. The navy flew us in a helicopter 50 miles up the Ross sea-coast from McMurdo to have a look at an Adelie rookery. That is where our host, the National Science Foundation, has the Adelie under constant study. A nearby Emperor penguin rookery is equally a study target.

Adelies and Emperors comprise most of the population of seven penguin species in the Antarctic. There being virtually no other plant or animal life on this ice covered continent centered at the South Pole, the penguin lives off the sea. Fish and a shrimp-like shellfish constitute their diet. They in turn are delicacies to the killer whale and the leopard seal and, as eggs or chicks, the main course to the vicious Skua gulls.

Emperor adults stand 3 feet and weigh 60 pounds; the Adelie 18 inches and 14 pounds. Adult Emperors and Adelies are more than a match for Skua, the scavenger of the Antarctic. At nesting time and egg hatching time, the penguin savagely fights off the predatory Skua but loses many eggs and chicks.

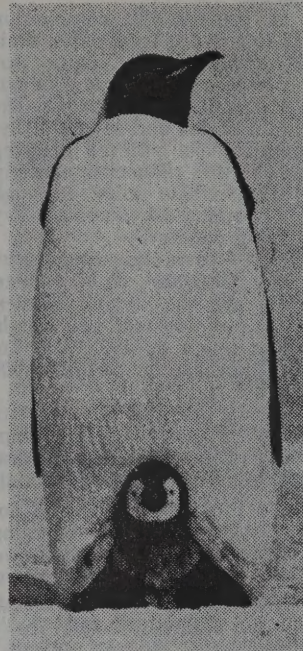
Having no enemy outside the water as an adult, the penguin sleeps when and where he wishes. He usually sleeps standing up, simply resting his head on his shoulder, but he may tuck his head under his flipper or even lie down.

It is embarrassing to us human beings, turning on our best personality to charm an Adelie into posing for a snapshot, to have him doze off in utter indifference.

Penguins all live close to the sea, as they do not fly at all and do not walk well. Associated Press writer Saul Pett, who was here 10 years ago with an expedition, wrote a classic description:

"With their white breasts, black backs and waddling walk, they look more like mechanical toys than birds. They move as if they had been wound up."

Penguins extend their flippers for balance when walk-



—US Navy Photo
An Emperor penguin chick huddles on its parent's feet to keep warm.

ing. They travel much better on their stomachs. Nature has designed their breast bones like the prow of a ship. In a hurry, a penguin may hurl himself across ice and snow, at up to an amazing 10 miles an hour, with flippers churning like oars.

In the water, he is superb. He is fast as a fish, dives as much as 2,000 feet deep in minutes, torpedoes himself out across the surface like a porpoise and, with a running start, propels himself out of the sea five feet straight up onto ice chunks or ledges.

The Emperor's stubbornness and strength give explorers endless tales. There was the time five men from a whaling ship, attempting a capture without harm to the penguin, got two leather belts around the bird's body after a rough struggle. Tired but satisfied, they stood back and took a deep breath of relief. So did the Emperor, bursting both belts!

If not molested, dignity is the penguin's hallmark, yet he is as curious about men as men are about him. Penguins have been observed waddling for miles to the edge of McMurdo, the only community on the Antarctic continent, to study what's going

on here.

Dr. Edward Wilson, who died with Capt. Robert Scott's party returning from man's second trip to the South Pole, made the first observations 60 years ago on one of nature's miracles — the egg laying and hatching of the Emperor penguin, at temperatures up to 80 degrees below zero, in the darkness of the six month Antarctic night.

Few persons fully believed the account at the time, but it has been confirmed over and over at the rookery near here, where huts of Scott's expedition stand just as they were then.

The female lays her single egg on the ice, then leaves immediately for the full period of incubation, 60 days. She gorges in the sea. Meanwhile, throughout the whole 60 days, the male stands on one foot and with the other holds the egg in a fold of fat between legs and stomach. No doubt he shifts feet now and then, but in the whole 60 days he eats nothing but whatever snow or ice he can pick up without releasing the egg or leaving the nursery. A few minutes in the cold would be fatal to the egg embryo!

A day or two before the egg is ready to hatch, the mother returns from the sea and tidies the nursery. Then the male, weak, wobbly, dehydrated, his reserve fat exhausted, staggers away to rebuild his strength on fish in the sea and mother takes over. Eventually the father returns. Mother and he feed and guard the chick, on their feet, against their breast feathers, through cold and storm. When the Antarctic sunrise begins, in late September, the new Emperor is ready to fend for himself.

The smaller Adelies lay two eggs each and in the Antarctic summer, which is now. They are ready to introduce their chicks to the sea as winter sets in. Instead of bare ice, their nests are composed of pebbles.

The courtship is calm and dignified, pursued with grace. In appearance, male and female penguins cannot be distinguished by men. So we don't know whether the male or female begins the intro-

duction with a deferential bow.

After several bows, male or female rejects or accepts. The rejected retreats in humble mien and seeks another mate: If love blossoms, the couple cross their beaks and lay their necks against one another, murmuring gently.

In a few moments, one nibbles at the other's neck feathers and the murmuring turns to rattling cooing. This is slowly reciprocated but there is a gradually rising tempo and temperature until the excitement becomes intense and...

Well, the growth of the young Adelie penguin is rapid and well supervised. Certain of the adults are designated to watch over the young in a group while the others gather food for them or go off to the carefree pleasures of parents who have left their youngsters with babysitters.

Like children they scale snow slopes and one rules as king of the hill until upset by a challenger. They toboggan down slopes. Sometimes they eat and eat, and at once regurgitate and eat and eat again.

Penguins seem to delight in group exercises, marching in military order, sharply angling right or left, falling precisely out of multiple lines into single formation, responding in clocklike timing to directional signals not detectable by human observers.

The scientists believe penguins are not very smart. They think there is a natural automation in their manners and procedures.

They are social and live in large colonies. The one we visited had a population of perhaps 50,000. Some Antarctic colonies run into the hundreds of thousands.

Despite all our studying of them, the penguins are at one and the same time one of Nature's most mysterious and remarkable inventions.

ICE CAP VAST

The greatest single source of water stored in ice is in the Antarctic ice cap, which covers about 6 million square miles. Experts calculate that if it melted at a uniform rate it would yield about 6.5 million cubic miles of water. This could feed the Mississippi River for more than 50,000 years, all U.S. rivers for about 18,000 years and the Amazon for about 5,000 years.

Guard Against Polar Pollution

By Arville Schaleben

McMurdo, Antarctica —

Wanting a place where no other living thing ever had been, where in the world would you go?

Answer: Almost anywhere in Antarctica, the pristine continent, 99.999% pure, sterile as a surgeon's scalpel; 95% of it aged in ice up to 100,000 years old, most of it not even seen, much less even breathed upon;

Paced by the affluent and efficient Americans, scientists of the world mean to keep this great natural icebox that way as long as possible.

This summer (our winter) the National Science Foundation put 50 field parties into Antarctica. They will bring back their garbage and rubbish, abandon no equipment, leave behind no fuel or food.

With a summer population of 1,000, McMurdo is Antarctica's biggest contaminator. It takes extraordinary precautions against being unduly so. Radioactive wastes from the nuclear power plant, which produces heat, light, power and fresh water, are encased and disposed of far to sea.

The community has no central sewage system. Plastic bags receive refuse from the latrines and eventually the sea far out claims them, too.

The navy's Operation Deep Freeze, support force for the scientists, operates McMurdo base precisely as if it were a ship at sea — in fact McMurdo duty is technically sea duty. It's a tight ship. You see no litter. Trucks haul scrap containers out onto the annual ice where they sink into the deep as the ice crumbles in season. No contaminants go into trash dump.

It is terribly dry here; dehydration is a problem. So soda, beer and other liquids are consumed in heavy quantity. But woe to sailor or scientist caught tossing empty bottle or can by the wayside!

In the cold of this continent it takes 4,000 calories a day to keep up average body temperature. Still, all the hard-to-come-by human energy used in caretaking becomes worthwhile when you realize that Antarctica has passed in this century from exploration to scientific study. There is at present no other reason to be here, though exploitation is sure to follow.



—US Navy Photo

A scientist purifies his trowels with a blow torch to get uncontaminated samples.

So what's Antarctica? Here are assorted facts.

Over countless years snow and ice have built up on all but 4.5% of the land. Even without the ice, Antarctica averages over 3,000 feet above sea level, highest of the seven continents. Its Transantarctic mountains peak at 16,864 feet.

Ice is a mineral, just as truly as coal. It melts, hardens, crystallizes, turns to gas, only at different temperatures than we associate with other minerals. Count the ice and Antarctica's average elevation is a startling 8,000 feet. North America's is 2,000.

From our press hut you can see Mt. Erebus and its constant plume, a very active volcano.

Two great seas, Ross to the south and Weddell to the northwest, dent the continent's 18,500 mile coastline to within 700 miles of each other. Ice 600 to 1,000 feet thick partly covers both.

Temperatures vary greatly but, taken overall, Antarctic regions are 35 degrees colder than Arctic. So there are no sizable plants, no trees, no animals that live off the land. Moss and lichen fungi, a few grasses and two diminutive flowering plants appear in summer in some of the iceless areas.

Several tiny insectlike creatures take shelter and food in clumps of these hardy plants.

Only 12 kinds of birds live on the continent, most of them in the Antarctic peninsula below South America's tip. The seven species of wingless penguins live on ice or rocks but eat the bounty of the sea.

The Atlantic, Pacific and Indian oceans lap the continent. Those waters are sometimes called the Antarctic ocean. They are less salty and more lush than northern waters. They abound in life ranging from microscopic plants to whales.

The blue whale — 150 tons, 90 feet long — is the largest living thing. The killer whale is named for its disposition. Killer whales have charged through three feet of ice to dump a seal, that is, a meal, into the water.

We know the continent has coal and therefore likely oil and natural gas. But under the ice the continent may be mostly bed rock and we know little about possible other minerals.

The continent's known ice depth is 14,000 feet. Much of western Antarctica's land mass is a basin 2,000 feet below sea level, depressed by the weight of the ice.

The only rivers on the whole continent are glaciers. Flattening out from highest levels on the east and the west sides of the continent, the ice moves constantly out over the sea until it breaks off in great flat icebergs in more northern waters.

If Antarctica's ice melts, the levels of our oceans will be raised 200 to 250 feet. That would be goodbye Florida, and the world's seaport cities, and the Statue of Liberty except for her head.

Sometimes in midsummer here at McMurdo the temperature gets up to 32 degrees. For a single day, it got as high as 4 degrees above at our South Pole station. The average there is 57 below. It got to -127 at Russia's Vostock station in August, 1960.

Wind is worse. South of here, on the long coast facing Australia, 50 mile an hour winds week after week are normal. They are frequent here at McMurdo. Hundred mile winds are common at our interior stations. Sometimes they blow that way for days.

Little Diomedede: Cold War

By JULES LOH

AP Newsfeatures Writer

LITTLE DIOMEDE, Alaska
— Seven National Guardsmen. Three M14 rifles. One grenade launcher. One grenade.

Sleep easy, America. These are your armaments at this tiny spot on the globe where the United States and the Soviet Union come within 2½ miles of touching fingertips.

Somehow, the armaments seem more superfluous than puny.

Somehow, in fact, the whole scene out here in the middle of the Bering Strait—Russia's Big Diomedede and America's Little Diomedede, two stark gray heaps of rocks cold shouldering each other from opposite sides of the International Date Line—seems a ridiculous caricature of the superpowers of East and West.

Out here, where the twain meet in icy isolation, an American squints through a telescope at the forlorn shack atop Little Diomedede and sees a Russian lookout squinting back. Both feel the same urge. They wave.

Suppose somebody decided to walk across the ice and go visit that fellow?

"We would stop him," Andy Kunayak said evenly. Kunayak is one of Little Diomedede's seven Eskimo Scouts, as Alaska National Guardsmen are officially called.

A few years ago a visitor named Bill Fane tried it. He was spotted walking across about 2 a.m. while the villagers were watching a movie. Kunayak and four other Scouts grabbed their rifles and fetched him back.

Reports persist that Eskimos still visit back and forth between Siberia and Alaska, as in the old days, but that hasn't been so for a generation.

In the summer of 1947, a group of Little Diomededes, unaware that a cold war they never made and an Iron Curtain they couldn't see had divided the Diomedede twins, crossed the strait to visit with kinfolk and were captured by strangers.

Sitting in the warm yellow glow of a seal oil lamp on the floor of his cozy, sod-covered home, Jacob Ahkinga, a Little Diomedede oldtimer, recalled the incident with bitterness.

"There were 27 of us," he said. "We went across in two skin boats. The soldiers took the boats and made us stay in tents on the rocks.



"They kept us there 46 days and then told us we could leave. A storm came up and we had to stay six days longer. All they fed us was a briny soup once a day. We came home weak and dirty and hungry."

Not too long after that, David Kaneveak was out hunting walrus and decided to take a snooze on the floating ice. A Russian soldier roused him and marched him over to Big Diomedede but turned him loose the same day.

The experiences taught Little Diomededes to keep their distance. Children learn early not to wander too far out on the ice, which is their playground all but four months of the year.

Actually, the forbidden isle across the strait does not tempt the Little Diomededes overmuch. They know their relatives don't live there anymore—probably removed to the Siberian mainland—and the only humans on Big Diomedede are the handful of Russian sentries.

Bush pilot Jim Isabel discovered that melancholy fact several years ago when curiosity got the better of him on a flight to Little Diomedede.

"Aw, what the hell," he said to himself, and banked his plane sharply toward Big Diomedede. He made a complete circle of the island. The Eskimo village, which is out of vision from Little Diomedede, was deserted.

The Russians, for their part habitually circle Little Diomedede in a speedboat every summer to reconnoiter the opposite side.

They needn't. The only occupants of Little Diomedede live in its one village—its Eskimo name is Ingaluk—which snuggles precariously against the cliff on the west side of the island in full view of the Soviet observation post.

By the 1970 census, the village has 82 occupants, 15 families all related to some degree. The

seven National Guardsmen represent every able-bodied man in the qualifying age group. The school population, grades one through eight, is 15.

The island is a flat-topped stack of granite boulders rising 1,308 feet. It is two miles around at the base.

In summer, fresh springs cascade from the heights and swarms of auklets, murres, puffins, and terns nest in the rocks and feast on shrimp stirred to the surface in the turbulent strait where the Arctic Ocean and Bering Sea collide. The villagers catch auklets, a table delicacy for them, in butterfly nets. Russian soldiers on Big Diomedede shoot them with shotguns. Little Diomededes fear that might drive the birds away.

Over the years, the centuries the Little Diomededes have sculpted their hillside village site into tiers, the easier to climb from one home to another. In winter, which lasts through May, one simply skids from place to place unless, like the villagers, he has learned to walk on steep ice and snow.

Apart from the green-shingled Bureau of Indian Affairs schoolhouse at one end of the village and the corrugated tin National Guard armory above it—which also serves as the movie house—Ingaluk is essentially unchanged from antiquity.

Eight skin boats and two dog sleds rest upside down on racks in the foreground near the shoreline awaiting the ice breakup and the excitement of the walrus hunt. An Ingaluk male kills his first walrus at about age 7.

Homes, 20 of them, nestle in the cliffside at random. Walls and floors are driftwood, beams and supports are whalebone. Most are single-room dwellings about 12-by-12 feet with a 5½-foot ceiling—not roomy, but easy to heat when the temperature is 40 below and the wind whips the schoolhouse flag to tatters.

Even in summer a flag lasts no longer than two weeks on Little Diomedede. It is Patrick Omiak's job to raise it and lower it each day at 8 a.m. and 5 p.m., just as the manual says, even though dawn and dusk are meaningless in this land of midnight summer sun and perpetual winter darkness.

Eskimo dogs with yellow eyes and thick coats roam the island unchecked. "That's our radar,"

said Philip Ahkinga. "If anyone comes over from the other island the dogs will let us know."

Above the village, here and there on the rocks, sturdy wooden boxes rest with white crosses attached. Burials of necessity are above ground. The boxes long outlast their contents in the dry arctic climate before they ultimately disintegrate. The roving dogs and arctic foxes scatter whatever is left.

Out on the ice, frozen and odorless and also awaiting the spring breakup, are the winter's accumulation of honeybuckets from the village, which has no sanitation system.

And no year-round water supply. The villagers get their drinking water by melting year-old sea ice from which all the salt has leached out. The pure ice is visible among the frozen ridges by its bluish hue.

It would be hard to imagine a place on earth more remote than Little Diomedede.

The Alaskan cape is 26 miles away and the weather is so severe and unstable that bush pilots make the trip only rarely in winter and never know when they might get stranded.

The plane lands on a relatively smooth patch of ice marked by four oil drums. As it sets down the villagers rush out and engulf it like locusts, eager to hear the news, receive supplies, see a strange face.

In summer, Little Diomededes abandon their island and camp on the beaches of the mainland at Teller, Nome, Kotzebue. Before the sea freezes they return. Why? "It is our home," said Walter Kiminock in a tone that questioned why anyone should even ask.

At home, the Diomededes live for the walrus hunts in spring and fall. It is then that they get their year's supply of meat, which they keep in caves dug beneath their homes, natural deep freezers, and their year's supply of ivory, their only source of cash.

Every adult on Little Diomedede is a skilled ivory carver. Some, like Louie Ozenna and Walter Kiminock, are masters of the craft and their figurines and cribbage boards bring top tourist prices in Anchorage and Nome.

The island's economy makes Little Diomedede a study in microcosm of the culture clash that plagues all of Alaska's natives.

While influence on traditional

native ways has introduced the need for outboard motors, gasoline, sugar, flour—in short, the need for dollars.

Though all their instincts cry out against it, each year they kill hundreds of walrus in excess of their food needs simply to get the tusks, threatening the walrus population and thus their future.

Should they take jobs during the walrus migration to satisfy their need for dollars—as they did last year, remodeling the schoolhouse for \$6 an hour—their meat cellars go empty.

Never was a community more literally caught between a rock and a hard place.

Somehow the Little Diomedes survive the economic tugging, the loneliness of their island, the cruelty of its climate. Not just survive, but with a sense of humor.

Andy Kunayak and Davis Menadelook put out a mimeographed monthly village newspaper. Naturally it is called "Strait News."

In a recent issue, Kunayak recounts how the village received its first movie in eight months and everyone thoroughly enjoyed it. There was one small hitch. The film was in Cinemascope and the projector was not.

"So we saw some long people," the article said. "But we did not care too much, for it was rather funny, although it could have been better, for it was about the hunchback of Notre Dame."

BERING SEA SURVEY YIELDS OIL EVIDENCE

WASHINGTON—A detailed survey of the seabed beneath the northern Bering Sea in the area between Alaska and Siberia has uncovered new evidence of the existence of deep sedimentary formations of the type in which oil is often found.

The disclosure of the findings is made in a preliminary report by the Coast and Geodetic Survey, in collaboration with the United States Geological Survey.

Systematically explored during the survey was Norton Basin, which underlies the northern Bering Sea with extensive sedimentary deposits containing many geological structures that could trap oil and gas.

The new data will allow a much more accurate appraisal of the petroleum possibilities of Norton Basin and also throw new light on the history of the Bering Sea.

The 1969 studies were spaced 10 miles apart and were not intended to show the de-



Looking fit after their ordeal, helicopter crewmen Roland McNeil (center) and Brendan Kilmurray talk with Carl Brady, owner of downed craft, on arrival at Anchorage, Alaska.

Survive Arctic Crash

UMIAT, Alaska, Jan. 4 (UPI)—Two men who survived the downing of their jet helicopter and 12 days in the Arctic wilds wanted only showers, food and some rest today after hiking into this tiny village late last night.

Ronald McNeil, the 35-year-old pilot, and Patrick Kilmurray, 28, a mechanic, both of Anchorage, had been missing since Dec. 23 when they took off from Prudhoe Bay, on Alaska's oil-rich North Slope, to Bettles, a town about 250

miles south of Prudhoe Bay.

Their helicopter went down 40 miles south of this remote village, which is on the Colville River about 150 miles southwest of Prudhoe Bay and 200 miles north of the Arctic Circle.

The authorities had no details of the helicopter accident.

Both were in "very good condition" when they arrived here. They asked only for showers, food and some rest before their employer, Carl Brady, president of Era Helicopter, Inc., picked them up today for a flight back to Anchorage.

WEATHER IN ALASKA RUNS TO EXTREMES

WASHINGTON—No one ever said Alaskan weather was ideal, but some of its extremes are fantastic.

Temperatures often border on the unbelievable, Bern Keating writes in the National Geographic Society's new book, "Alaska." In the same year, for example, Fort Yukon registered both 100 degrees Fahrenheit and 71 degrees below zero.

Fortunately for many Alaskans, nature is kinder to the 49th state's biggest city, Anchorage.

"Only occasionally do Anchorage winter nights bring temperatures colder than —20 degrees F., and seldom does the summer sun push the thermometer past the 75-degree mark," Mr. Keating says.

To gather material for the book, the author and a National Geographic photographer, George F. Mobley, traveled on everything from airplane to walrus-skin umiak.

SOVIET BANS SHIPS FROM SEAL REGION

30-Mile Limit Around Isles
Imposed in North Pacific

MOSCOW, Jan. 7 (UPI)—The Soviet Union has declared a ban on all shipping within 30 miles of the Russian islands closest to America's Aleutian chain, according to the official press agency Tass.

The report said the ban was to protect seals in the Komandorski Islands. The action apparently extended the Soviet claim to a 12-mile limit to 30 miles in that area. Western trade experts said that such actions are achieved either by international agreement or are proclaimed unilaterally for conservation reasons.

The trade sources said there had been recent contacts among Japanese, Soviet and United States officials on proposals to protect the North Pacific seal herds, but that no specific agreement had been reached.

Tass said no shipping of any kind would be allowed in the zone.

The United States claims the traditional three-mile limit on all its territories, including the Near Islands, which are in the northern Pacific but well outside the 30-mile restriction around the Komandorskis.

New Fishing Rules Imposed

"A 30-mile zone where fishing and any work, including the setting up of navigation signs, is banned, has been set up around the seal colonies on the Komandorski Islands," Tass said.

The report also mentioned other restrictions in the Soviet Union's Far Eastern waters but did not describe the additional limitations.

"New fishing rules are being enforced in the Far Eastern waters, the biggest Soviet fishing area. Compared with 1962 rules, the new ones greatly restrict fishing for salmon, sturgeon and herring," Tass said.

The Soviet report said the 30-mile zone was necessary because of serious depletion of the once-huge herds of Pacific seals and Kamchatka beavers.

The 12-mile territorial limit adopted by many countries has long been a source of dispute among fishing powers.

In recent years incidents of arrests and damage to Japanese vessels working in waters off the Soviet-held Kurile Islands have produced diplomatic disputes between the two nations.

tails required for the development of petroleum and mineral resources. More refined surveys, usually run by geophysical exploration companies, would be necessary.

'65 Alaskan Quake Shifted Mountains and Tilted Island

WASHINGTON (AP)—The great Alaskan earthquake moved some mountains more than 50 feet, lifted a section of ocean floor five stories and left one island 30 feet higher and tilted to one side, the Coast and Geodetic Survey reports.

The Commerce Department agency's findings were made in the four years since the Good Friday tremor that killed 131 people and left more than \$750-million damage.

The agency said that the quake had shifted the Chugach and Kenai Mountains, 80 miles from Anchorage, 50 feet to the south and had dropped the south pass of the mountains almost 10 feet.

Alaska Curbs Hunting of Bears, and Killing From Air

By WALTER SULLIVAN

The New York Times

May 7

Oil prospecting activities on the treeless North Slope of Alaska have so decimated the grizzly bears of that region, one of the last large reservoirs of the species, that Alaskan officials have eliminated this year's spring hunting season. The season would have run from May 15 to May 31.

In addition, the officials have also curtailed the hunting of polar bears. This action followed an international conference on polar bears, held recently in Morges, Switzerland, at which it was disclosed that the polar bear population was barely holding its own against airborne hunters.

Soviet specialists at the meeting also expressed dismay, as they have in the past, at the shooting of polar bears by Americans in international waters along the pack ice north of the Siberian coast. It is illegal for Soviet citizens to hunt polar bears.

The status of the bear population and measures to save the two species from extinction were described in recent interviews with Alaskan officials and wildlife specialists.

They explained that, because the North Slope, which lies between the Brooks Range and the Arctic Ocean, is virtually without trees, bears and other big game are easily spotted from the air.

With the discovery of oil deposits, a multitude of geophysical exploration teams have come into the area. And while the oil companies have banned liquor, guns and women at their base camps, employees in the field carry arms as protection against bears that sniff out their garbage dumps.

Thus, as a result of self-defense—real or imagined—and from illegal hunting, the highly vulnerable bear population has been hard hit.

In the words of Charles J. Keim, a licensed guide and dean of the College of Arts and Letters at the University of Alaska, the animals "are in desperate straits."

One of Mr. Keim's major concerns is the practice of using aircraft to hunt down polar bears. He is also outraged by the mass killing of wolves, which reportedly bring \$200 apiece, half in bounty and half in sale price of the pelt.

In the airborne hunting, a visitor seeking a polar bear pelt



The New York Times May 7, 1970

Americans' main hunting areas are in black. Dark gray areas are used less intensively in the spring.

is assured of getting a bear with a minimum of time and effort.

Two planes fly over the pack ice in tandem until a bear is sighted. One plane then circles the bear while the other seeks a floe large enough for a landing.

The circling plane then swoops at the bear, driving it

at maximum speed across floes and pressure ridges towards the waiting hunter. When the bear comes within shooting range it is too exhausted even to rear and threaten its assailant.

Jack W. Lentfer, polar bear specialist of the Alaska Department of Fish and Game, reached by telephone this week at Barrow, the northernmost point in the United States, confirmed that this hunting technique was widely used. He had just returned from the conference in Morges, the third in a series that began in Fairbanks, Alaska, in 1965.

The participants included the five circumpolar countries. They reported the following polar bear "harvests": Canada allows 386 bears to be taken annually; the Danes in Greenland reported 100 to 150; the Norwegians about 300 and the United States a similar figure. The Russians allow no hunting.

This year's Alaskan season is over, so the new restrictions, which will decrease the number of bear-killing licenses, will go into effect next February.

Mr. Lentfer flies out from Barrow whenever weather permits, landing to tag bears in an effort to assess population trends, migration habits and the

like.

An international blood sampling program is also under way to see how many "races" of polar bears inhabit the north.

The bears are immobilized briefly with a drug-loaded syringe gun. Since March 1, when lengthening daylight made flights possible, Mr. Lentfer has tagged 60 bears. He expects to end his efforts for this season in a few days.

The survey should indicate whether, as some conservationists fear, the bear population is becoming younger, because of hunting, with a serious shortage of breeding males.

2-Layer Lakes Found in North

OTTAWA (AP) — A Canadian Defense Research Board team reported discovery of three lakes well above sea level in northern Ellesmere Island that are composed of sea water covered by layers of fresh water. The team speculates that the heavier seawater was trapped by advancing glaciers hundreds of thousands of years ago. Ellesmere is about 450 miles from the North Pole.

Ice-core studies indicate Greenland climate cooling

By the Associated Press

Copenhagen

Computer-aided analyses of a 4,000-foot core of ice drilled from the Greenland icecap have led a Danish scientist to predict the Arctic island will get colder and colder, with possible effects on the northern hemisphere elsewhere.

"Most likely, the Greenland climate will hit a minimum 10 to 20 years from now, and the next maximum will not occur till well into the next century," Prof. W. Dansgaard of Copenhagen University's institute of physics says.

Professor Dansgaard bases his prediction on measurements of oxygen isotopes in the ice core drilled from the icecap in 1966 by United States Army experts. He had the core cut into 7,000 pieces, some possibly 100,000 years old, and measured the quantities of oxygen 18, or heavy oxygen, isotopes present in each piece.

Temperature cycles seen

Since the presence of this isotope depends on temperatures prevailing at the time

when the ice was formed, measurement data furnished a picture of climatic cycles ever since, including the glacial period.

Reporting on his findings in a Danish periodical, the scientist says computer processing of the temperature data indicated that Greenland is now in a period of constant cooling. He does not speculate on the cause.

Seawater temperatures off Greenland have been declining since the 1930's, and some fish are leaving the area. Greenland fishermen have been hard hit by the departure of cod and shrimp from formerly rich grounds.

Professor Dansgaard says Greenland's fishery "literally hinges on a one-centigrade rise or decline in the mean temperature."

He believes the Arctic cooling is likely to affect several Atlantic regions, but he notes unpredictable factors, including the climatic effects of air pollution.

The search for further clues to the future Greenland climate will go on this summer, with new icecap drillings and surveys of icecap depths. Financial support is coming from the National Science Foundation of Washington.

Experts See Threat To the Polar Bears In Eskimo Increase

The New York Times

GENEVA, Feb. 7—Scientists meeting here have concluded that it may be necessary to change the eskimos' way of life "because the eskimo population is growing faster than the Polar Bear population."

However, polar bear experts from the United States, the Soviet Union, Canada, Denmark, and Norway—the countries with territory ringing the North Pole—say that prospects for the animal's survival are "good—if mankind is careful."

The experts met for three days at the headquarters on the Lake of Geneva of the International Union for Conservation of Nature and Natural Resources.

The experts noted, the union said, that polar bear hunting is part of the culture of many Eskimos as well as an important source of food and clothing.

"While it will be very hard to change their way of life, this may be necessary," the statement continued, taking note of the population curve.

Concern was expressed over the possibility of "serious ecological problems" resulting from oil spills, offshore drilling and other economic activity in the polar region, according to the statement.

FINAL REPORT ISSUED ON 1968 THULE CRASH

COPENHAGEN, Denmark, Feb. 28 (AP)—The United States and Denmark have formally closed the case of the B-52 nuclear bomber crash near Thule Air Base in Greenland two years ago, agreeing that the accident caused no danger to man or animal and plant life in the area.

But a joint 96-page report by the Danish Atomic Energy Commission and the United States Air Force pointed up the enormous task and immense problems facing military men and scientists after the Strategic Air Command bomber crashed on the offshore ice in Bylot Sound on Jan. 21, 1968. Four nuclear weapons disintegrated on impact and in a column of jet fuel fire leaping 2,500 feet toward the Arctic sky.

"The seemingly insurmountable task of recovering and removing all traces of the accident proved again that truth

Soviet Plans 2 More Atomic Icebreakers

The New York Times

After long hesitation the Soviet Union has announced plans for the construction of two more atomic icebreakers to clear sea lanes off the north coast of Siberia. The first is to be completed by 1975.

The new ships will be twice as powerful as the Lenin, the Soviet Union's first nuclear icebreaker, which completed her 10th season last year. They will be part of a new series called Arktika.

Izvestia, the Soviet Government newspaper, in announcing the program, said the additional icebreakers, to be built in Leningrad, would help extend the shipping season off Siberia's Arctic coast from the present four and a half months to six months.

The Soviet Union uses the Northern Sea Route, as the

Arctic sea lane is called, to supply northern outposts and mining centers and, if ice conditions permit, to carry freight from northern European Russia to the Pacific.

The only other links between the two extremities of the Soviet Union are overland via the Trans-Siberian Railroad or the long southern sea route around Africa and Asia.

The addition of two more icebreakers would put the Soviet Union in the forefront of nuclear-powered shipping. The United States nuclear freighter Savannah, launched in 1959, has been engaged in cargo service under charter to American Export Isbrandtsen Lines since 1965. The West Germans completed the Otto Hahn, an ore carrier, in 1968, and Japan launched the Mutsu, a nuclear freighter last year.

Although the Russians planned to build additional atomic icebreakers when the

Lenin was launched in 1957—the ship went into service in 1960—a final decision was deferred until the vessel's performance could be studied. A decision may also have been delayed pending development of improved and more economical ship reactors.

According to Izvestia, the reactor designed for the Arktika series will keep the icebreakers at sea for five years until a recharge of uranium is required. The Lenin must be refueled every two years.

Based at Murmansk, the Lenin has been clearing paths through the Arctic ice for convoys of freighters from mid-June until the end of October. The Russians hope that the additional icebreakers will ultimately make possible year-round shipping, at least in the western and eastern sections of the north Siberian coast.

Busy Year Is Expected for Ice Patrol

March 2

The tanker Manhattan's prospective second voyage to Alaska by way of the Northwest Passage early next month will mean greater responsibilities for the Coast Guard's annual international ice patrol.

Comdr. James R. Kelly, in charge of the patrol, said here that ice surveillance, traditionally confined to east-west trans-Atlantic shipping lanes, would have to be extended to cover a new area from north to south. It would include the Labrador Sea, Davis Strait and Baffin Bay—waters to be traversed by the Manhattan to and from Alaska.

The opening move in the patrol's 1970 season was made Friday with the first of three preliminary ice survey flights. The regular season is expected to start in about two weeks.

The initial flight was made

by an HC-130B Coast Guard aircraft, which took off Friday from Argentia, Newfoundland. The other two flights are to be made from Goose Bay, Labrador.

Commander Kelly said patrols expected to find the presence of icebergs in the Atlantic in larger than usual numbers. He based this estimate on the fact that the 1969 season was a light one with only 57 icebergs having been reported to have drifted south of Latitude 48 North, compared with a normal seasonal drift of about 220 bergs.

The primary job of hunting for icebergs will be performed by aerial observation, he said, with regular flights as often as weather conditions over the fog-shrouded Grand Banks permit.

At sea, the patrol's work is to be performed by the cutter Evergreen, based at Boston. The vessel is to put to sea on April 1 for a 30-day oceanographic cruise in northern waters.

Another, as yet undesignated, cutter is being placed on standby to be ready for service in the unlikely event that icebergs dangerous to shipping have to be kept under visual observation for long periods of time.

Creation of the patrol was prompted by the sinking in 1912 of the British passenger liner Titanic. The passenger

ship, on her maiden voyage from Great Britain to New York, sank after striking an iceberg with the loss of 1,513 lives.

The patrol's first season was in 1914. It has performed its annual work regularly ever since, with the exception of several years in World War I & II.

Canadian Troops to Train In North Throughout Year

OTTAWA, March 21 (Canadian Press)—The Canadian armed forces will begin training in the north on a year-around basis starting in April the Defense Department announced today.

About 500 soldiers will take part in an exercise called New Viking between April and September. Rotation will take place every two weeks on a two-platoon, 50-man basis.

Following completion of the April-September phase, another group of soldiers will receive identical training starting in mid-October.

Hurricane Rips Greenland

GODTHAAB, Greenland, Feb. 7 (AP)—A hurricane left at least 100 persons homeless in the town of Angmagssalik in Southeast Greenland, according to radio reports from there today. There were no reports of deaths or injuries as the town of 800 was ripped by winds said to have reached 100 miles an hour.

To find out how the Weddell seals live, we spent the spring with them on the ice and in the ocean.

■ The great roof of ice above us glowed with a soft twilight. We swam in deep blue water that looked black in the depths below. Seals glided by, their big eyes gazing at us unblinkingly. They made eerie chirps and trills that sounded like music from another planet.

By diving with these seals under the six-foot-thick Antarctic ice we were trying to learn about their underwater behavior, adding to what we had observed of the animals above the ice.

Camping at Turtle Rock

In October, the Antarctic spring, we set up camp at Turtle Rock (*see photo*), a cone-shaped hill that juts 200 feet above the ice near the base of towering Mount Erebus, an active volcano about 1,000 miles from the South Pole. Each spring Turtle Rock becomes a seal *rookery* (breeding area) where the females give birth to their pups. The rock provides shelter from the wind and a way to the sea below.

A crack in the ice, kept open by the tides, stretches from the north face of the rock toward Mt. Erebus. Seals gather along this crack, keeping holes in the ice open by sawing with their upper teeth through the soft ice that forms in the crack every night. Through the holes they must go to find fish to eat. The seals can dive to about 2,000 feet. They can stay underwater for as long as 45 minutes before coming to the surface for air. They must find a breathing hole in the ice or else die for lack of air.

The seals can't see far in the water, especially during the dark Antarctic winter. It seems as if they must depend

on echoes to find their way around (as porpoises and bats do). The seals chirp and trill a good bit, sending out sound waves that bounce back through the water from a solid object such as ice. If a chirp directed up at the ice brings no echo, the seal may know there is a hole in the ice above. (Since the seals can't smell without breathing, and can't breathe underwater, it also seems possible that the seals depend on echoes to locate fish for food.)

The first seals had already gathered at Turtle Rock when we arrived in tracked vehicles that had crossed the ice from McMurdo Station. We used chain saws and dynamite to make holes in the ice so we could dive below. We lived in a wooden shack that was also used as a weather station and for recording underwater sounds. We could see most of the seal colony from the shack's big window.

A second shack had an opening in its floor. This shack was put over our diving hole in the ice. The seals at Turtle Rock hardly noticed us as long as we kept a few yards away from them. If we came within 10 feet, they would roll on their sides, wave a flipper, and make clucking sounds or snap their jaws. If we came too close, they humped off across the ice or slithered through a hole into the water below.

The Weddell seal is the only ocean mammal that can be easily approached and observed in its own world. Unlike the Arctic, Antarctica has no land animals, such as polar bears and Eskimos, that kill seals. Whales sometimes kill Weddell seals, but the seals are usually safe when they are near shore. The seals are fearless of man, in or out of the water.

This aerial view of Turtle Rock shows the shacks (far left) used by biologists as they studied Weddell seals (the dark shapes on the ice). Turtle Rock is seven miles northeast of the United States' McMurdo Station in Antarctica.

by Michael A. de Camp



This photo shows Dr. Carleton Ray measuring a young seal to check on its growth. The author, Michael A. de Camp (see cover), is a diver and photographer and teaches science at a private school in New Jersey.



Into the Dark, Cold Sea

In order to study the seals, we decided to become as much like them as possible. To do this we put on rubber "wet" suits to protect us from the cold, and double SCUBA diving tanks so we could stay below an hour or so at a time. When we dropped through the deep layer of shredded ice in our ice hole, we entered an alien world.

The water temperature was 28.6 degrees Fahrenheit, just at the freezing point of salt water. It was dark, but clear enough for us to see 300 feet or so. Below us the black bottom was sprinkled with golden worms. Red starfish and purple sea urchins spread out before us in the deep blue darkness like stars in the Milky Way.

We had to swim some 200 feet from our hole under the shack to where the seals were swimming near their own holes in the crack. The intense cold of the water might freeze our air regulators; if it did, the hole was too far away and the ice was too thick for us to escape. So we

stayed close together and watched each other carefully. The beauty of the scene was so overpowering that it kept us from feeling the cold and danger.

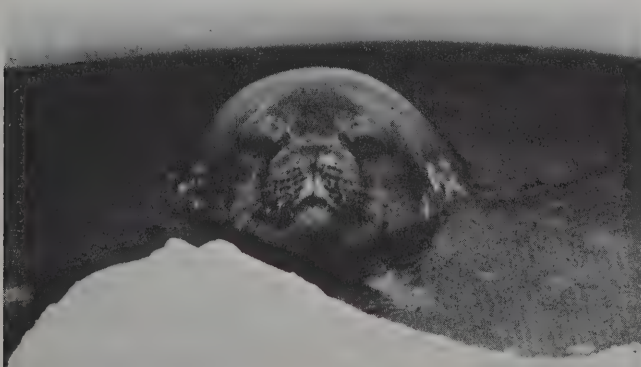
Suddenly a female seal appeared, swimming between us, inspecting our cameras and masks, and even bumping against us. Around and around we whirled with the curious seal, trying to stare her down with our faces only inches from hers. She stayed with us for most of the dive, leaving only to surface for air.

Never again were we so carefully inspected by the seals. It seemed as if the "scout" seal had "informed" the others that we were up to no harm. In our four-week stay at Turtle Rock, we spent over 23 hours under water. Our longest dive lasted 70 minutes.

A Pup Is Born

Each day when we went from our shack to count the seals, we found new pups all around us; but we had not yet been able to witness a birth. (Once we noticed a large seal waving its flippers in the air and straining its stomach muscles. We rushed up to it and found it was a male that must have been dreaming.)

In early October, after keeping an around-the-clock



In some unknown way, seals find breathing holes in the ice after swimming underwater for as long as 45 minutes.

NATURE AND SCIENCE

September 29, 1969

watch on the seals, we observed the birth of a pup and photographed it with a movie camera. The seal pup was born on the ice, soaking wet, into a world 102 degrees colder than the 99-degree temperature within the mother's body.

If the weather is very cold and the pup is exposed to the wind, it will die. However, we noted that pups born later in October when the weather was warmer sometimes died. They needed the cold air to freeze the moisture on their fur so the crystals of ice would break off and leave the pup dry. If the air is too warm the fur stays wet, so the pup is chilled too much by the cold wind and may die.

The Weddell seal lives in the harshest environment on earth for a warm-blooded animal. Both the cold air and the evaporation of moisture from its fur by strong winds take heat from the pup's body. We tagged, measured, and weighed each of the first 25 pups born, and kept track of their movements each day. We found that the ones that stayed behind the rock, sheltered from the winds, grew more than 60 pounds heavier than the pups in more exposed areas.

Noisy Nighttime Swimmers

By mid-November, 47 fat, squirming pups with their mothers and about 13 males made up the rookery population. The seals were all around us, lying beside the shack and underfoot as we made our rounds of the colony.

Underwater, the seals were making more noise now, suggesting more activity there. Our *hydrophone*, or underwater microphone, picked up trilling sounds from other rookeries at Turks Head and Hutton Cliffs, as far as 10 miles away. As we tried to sleep after our midnight dives, the hut often shook with the trilling of nearby seals, and we could hear the breathing of others at the hole under our diving hut.

When a mother seal took her pup for its first swim, at first the pup would stay very close to its mother and near the breathing hole. Soon they began to swim farther away and farther apart, and we could come up close to the pup. The baby would come right up to us and nibble on our hand and arm or "dance" around us while its mother watched quietly from a few feet away.

The pups nurse for about six weeks, growing from about 60 pounds at birth to 300 pounds or so on the rich milk. The pup has to fatten up quickly in order to have a food reserve for the difficult first winter. Its thick baby hair provides little protection against the cold when it is wet, but the seal soon develops a three-inch layer of *blubber*, or fat, that helps hold heat in its body.

Winter in the Water

In December, the mother and pup separate. The seals probably mate at this time, though this has not been observed. In March the sun drops below the horizon, and the ice—which had broken up in January and February—begins to form once again. Where the seals go during the long winter night in the Antarctic is not known for sure. They may go just a few miles from the rookery, staying in the water for weeks at a time and coming up only to breathe. The water is cold, but it is much warmer than the winter air above the ice.

We learned a lot about the Weddell seals while living in their rookeries and swimming with them in the ocean. As a result, the seals in this barren and far-away place may be the best understood marine mammals of all. But how do the pups learn about the deep sea? How do they spend their first winter? How does the Weddell seal find a tiny life-giving hole in the ice, which it cannot see from the ocean depths or in the dark of the long Antarctic night? These are just a few of the questions still to be answered ■

The Seventh Continent

by Daphne Machin Goodall

(The Priority Press Ltd.,
74 pp., 42 shillings)

The best part of this book is its photographs, which are superb by any standard. Although I expected an intriguing account of Antarctica, I find that in actual fact only one chapter of four pages is devoted to the seventh continent. Of course by reading the fine print under the title one gets the real clue as to what the book is about. "A woman's journey to Antarctica", and under this heading we are treated to the story of how the author travelled by way of South America, and took off from Tierra del Fuego in the good ship "Navarino". Much of the voyage is devoted to the many birds and ornithological specimens to be found in the southern ocean. There was a stop at Port Stanley in the Falkland Isles, and the author then reminds us

of the current dispute over these islands by the Argentine. The ship stopped at various islands to allow the passengers ashore and to enable film crews from several countries to film the wildlife species which abound. The author records her great enthusiasm at the first sight of Antarctica, at a peninsula which had two names depending on whether you were English or American. Even this far south international disputes arise which take time to resolve. While this book introduces the reader to Antarctica, it only whets the appetite, for obviously when so many nations are involved there in the pursuit of peaceful scientific research, there is much to be recorded. The author merely introduces the reader to snippets of information on biology, geology, archaeology and palaeontology, of this vast continent, in just sufficient doses as to encourage the inquisitive nature of man to want to know more. Furthermore, the author

has positive ideas about woman and Antarctica, and in her best suffragette style demands to know why the female of the species has not been allowed to play her part in the systematic scientific programs now being carried out by many nations. One matter on which the author makes a positive point, i.e. on the disreputable condition of some of the bases. The garbage and refuse which litters the sites would never have occurred had there been woman scientists in residence. Surely if the rest of the world is being polluted, let us save Antarctica from a similar fate.

Perhaps the book can best be summed up as an interesting introduction to a mysterious continent. The author ends this short but informative book with a plea to leave Antarctica in its wondrous and barbaric beauty for all mankind to share.

L. A. C. O. HUNT

Canadian Geographical Journal

Says a Baby Walrus Will Smother You With Love

By WALTER SULLIVAN

The New York Times

June 8

Beware the baby walrus. Its affection can be overwhelming.

That, at least, has been the discovery of Dr. Thomas C. Poulter, an experienced polar scientist, who has been studying the various ways marine mammals use sound.

"Whereas the Weddell seal pup may rest its head on your knee," he reported in a recent letter to Arctic, journal of the Arctic Institute of North America, "the walrus is not satisfied unless it can climb all over you even after he gets up to 1,500 pounds or more."

Although the walrus has been hunted by Eskimos for many years, he said, it is "the most naturally affectionate of all marine mammals."

In his report and in a telephone interview last week, he told how other such species display their lack of fear of human beings. In the Antarctic, when he was sitting cross-legged on the snow photographing a ponderous Weddell seal, the seal's pup wriggled over and laid its head in his lap.

Even after the frightening experience of capture, such mammals rapidly become tame. A Steller sea lion pup loses all sense of fear within 15 minutes, although in related species this may take several days.

The observation is of interest to those seeking to understand the evolution of instinctive fears. When Charles Darwin, as a recent graduate of Cambridge University, made his memorable voyage aboard the Beagle in the eighteen-thirties, he was struck by the tameness of animals on some of the islands.

This was particularly true of the Galapagos.

"A gun is here almost superfluous," he wrote, "for with the muzzle I pushed a hawk off the branch of a tree." Darwin watched a boy with a switch knock over turtle doves as they came to drink at a well until he had a heap for his dinner.

Although men had visited or lived on the islands for more than a century, the birds still had not acquired an instinctive fear of man. Hence Darwin concluded that the instinct evolves slowly but, once acquired, persists even when the birds no longer have reason to fear



Stanford Research Institute

Scientist embracing two of the overwhelmingly affectionate baby walruses

men, as with species in England that are no longer hunted.

"We may infer from these facts," he said, "what havoc the introduction of any new beast of prey must cause in a country, before the instincts of the indigenous inhabitants have become adapted to the stranger's craft or power."

Dr. Poulter's diverse career included serving as chief scientist and second in command of the Byrd Expedition to Antarctica in 1933. He headed the chemistry department and then the physics department at Iowa Wesleyan College. In 1948 he became associate director of the Stanford Research Institute in Menlo Park, Calif.

Now, at a vigorous 73 years of age, he directs that institute's Biological Sonar Laboratory.

One of the most remarkable discoveries there, he said, has been the apparent role of the whiskers on Cali-

fornia sea lions as sonar antennas. The whiskers are,

linked to a highly developed nervous system and may account for the extraordinary ability of those animals to tell fish (which they crave) from meat (which they abhor).

When a fish, in complete darkness, is thrown into the pool, the sea lions dart for it. When a piece of meat cut to the shape of a fish is thrown in, they ignore it.

Smell could not play a role under water, Dr. Poulter said, and the animals can make the distinction even when fish or meat chunks are enclosed in water-filled plastic bags.

Apparently, he said, their sonic detection system can tell the texture of the target that returns an echo to their whiskers.

The walrus sonar is much less developed, he said. Dr. Poulter obtains his pups with the help of Alaskan Eskimos and raises them on about one gallon of formula per day. The formula consists of three quarts of whipping cream, homogenized with a pound of clam meat, vitamins and

other additives.

When a half-gallon bottle with a large nipple is thrown into the pool, the pup may take it between its flippers, lie on its back and guzzle. It gains 12 pounds a week from its birth weight of 120 pounds. The adult weighs 3,500 pounds.

In view of the affectionate nature of young walruses, he said, it "soon becomes unsafe to get into a pool with them because of the danger of being drowned, and out of the water one may be pinned down so as to require help to get up, particularly if there is more than one walrus."

"Their baby-like whimper and low-pitched woof! woof! and their apparent desire for physical contact with human beings made them one of the most attractive of the marine mammals," he said.

Antarctica's highest mountain is 16,860-foot Vinson Massif, which was not discovered until 1957. First conquest of the windy frozen peak was made in 1966.

Pipeline Creates a Storm Over Ecology

E. W. KENWORTHY
The New York Times

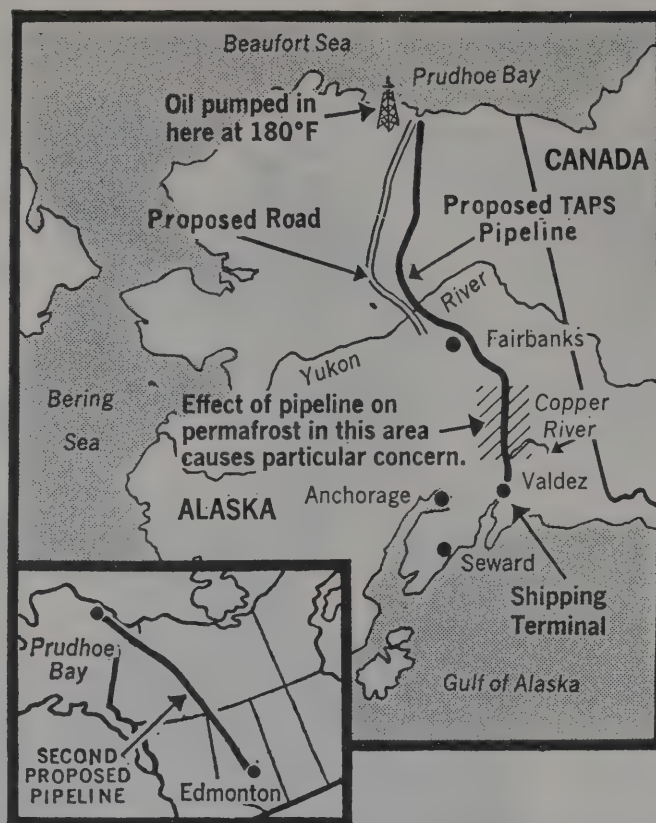
April 19

WASHINGTON — Valdez (population now 1,200), a deep-water port on Prince William Sound, will be the southern terminus of the 800-mile, 48-inch, \$1-billion pipeline that the Trans Alaska Pipeline System (TAPS) will construct to move the oil from the incredibly rich new field at Prudhoe Bay on the Arctic North Slope.

Stacked up right now on Valdez shores are 200 miles of Japanese-made pipe; another 50 miles are stacked up at Fairbanks. TAPS had hoped to have the pipeline finished and oil flowing by mid-1972. But this schedule depended upon the competition of a 390-mile gravel road to haul the pipe over a now roadless stretch from the Yukon River, across the Brooks Range to Prudhoe Bay. Right now, a half dozen road contractors have assembled \$42-million worth of specially heavy machinery at strategic points along this route. TAPS hoped construction would begin on the \$110-million road this month and be finished before the Arctic winter set in.

Last week it became clear that this timetable would be thrown off by at least a year as Secretary of Interior Walter J. Hickel delayed issuance of a permit for the oil line right-of-way across Federal lands, and United States District Court Judge George L. Hart Jr. in Washington enjoined Mr. Hickel from issuing a road permit until complaints brought jointly by the Wilderness Society, Friends of the Earth and the Environmental Defense Fund, Inc. were tried on the merits.

Mr. Hickel could hardly have done otherwise unless he had chosen to ignore the warnings and advice of W. T. Pecora, director of Inter-



Opposition from conservation groups has stalled, probably for a year, construction of a road and pipeline across the Alaska wilderness to the new North Slope oil field (see main map). Inset map shows route of a second proposed pipeline through Canada.

ior's Geological Survey, who heads a special task force named by the President to keep watch on TAPS's plans to insure maximum safety and concern for the environment.

The fabulous North Slope strike is providing a test case for the nation's new-found anxiety for environmental protection, and inevitably there is an intense struggle between the developers and the conservationists.

For the oil companies there is a pool of oil conservatively valued at \$60-billion which can be delivered at Valdez for about \$1 a barrel. For the State of Alaska there are competitive leases and royalty payments which will also run into billions. For the conservationists there is a vast unspoiled wilderness.

Between these forces, which would have been hopelessly unequal a few years ago, are the geologists and biologists who are not averse to development but who are

acutely aware of the fragility of Alaskan ecology. "This may be the most important environmental decision of the decade," said an Interior Department official last week.

The oil comes out of the North Slope at 180 degrees Fahrenheit and will flow at that temperature most of the length of the pipeline. TAPS planned to bury the pipe for 750 of the 800 miles. The concern of Mr. Pecora and his geologists centered on the effect of this hot pipeline on the permafrost, the frozen layer of gravel, sand and ice covering much of Alaska and 85 per cent of the pipeline route.

Scattered through the permafrost are "ice wedges" formed when water in cracks of the surface tundra freezes and enlarges, and "ice lenses," subsurface lateral blocks of ice. If the hot oil should melt this ice, the permafrost would disintegrate with possible serious erosion. Furthermore, if the erosion left the pipe unsupported, it might

break with the weight, and oil would spill and foul the streams in which the natives take salmon, their principal food supply.

Mr. Pecora was particularly concerned about the effect of the permafrost in stretches north of Fairbanks and in a 70-mile stretch of the Copper River basin between Valdez and Fairbanks where TAPS planned to put all but seven miles underground.

Consequently Mr. Hickel decided to hold up the permit for the pipeline right-of-way until agreement was reached between TAPS and his scientific advisers.

Mr. Hickel was, however, ready to issue the permit for the road right-of-way, so that construction could begin immediately. Mr. Pecora had assured him the road could be built safely.

But the suit of the three conservation groups thwarted this plan. They asked for an injunction on two grounds. The first was that the 100 foot right-of-way for the pipeline was 46 feet more than the law allowed. Second, they charged that, with respect to the road, Mr. Hickel had not adequately complied with the new National Environmental Policy Act, which requires Federal agencies, when recommending any action possibly affecting the environment, to submit a statement detailing the impact.

Mr. Hickel's Justice Department lawyer contended that the Secretary had submitted an adequate statement and argued that he had "separate" authority for the two permits and therefore should be allowed to issue the road permit.

But Judge Hart said the pipeline and the road were parts of the same enterprise. He thereupon issued a preliminary injunction against issuance of the road permit until the issue could be tried on its merits. If the Government objected to this ruling, he said, it could go to the court of appeals.

FEW MASTERS

Few foreigners ever master the language of the Eskimo people completely, according to the Encyclopaedia Britannica.

Manhattan's 2d Trip Spurs Hope

By WILLIAM D. SMITH
The New York Times

May 25

The S.S. Manhattan will head home this week from her second voyage into Arctic ice with new hope of having proved the economic feasibility of opening the Northwest Passage to commercial shipping.

The odds favoring a marine solution to the problem of transporting Alaska's North Slope oil riches to East Coast ports of the United States have improved considerably in the last two months, according to the sponsor of the expedition.

Humble Oil and Refining Company does not expect to make a final decision before the end of the year, but the indications are that the Manhattan, the largest nonmilitary vessel flying the American flag, has truly broken the ice. A new breed of mammoth ice-breaking tankers to move the oil will probably be built.

A positive decision could create the greatest shipbuilding boom in the United States since World War II. Up to 40 ships costing between \$60-million and \$100-million each would have to be built to keep the oil moving continually through the passage.

The data gathered on the present trip and on the Manhattan's maiden voyage through the Northwest Passage will be the final determinant. This information will be run through computers and analyzed by mathematicians, ice scientists and naval architects.

Predictions coming back from the ship, however, point to increasing optimism on the part of the expedition's leaders about the practicality of ice-breaking tankers.

Politics and over-all industry economics also seem to have swung in favor of a ma-

rine solution to the North Slopes oil transportation problem, sources close to the situation say.

On the economic front, the industry had hoped to move the oil, considered the largest discovery ever made on the North American continent, to market by the end of 1972 or early 1973. It was to flow through the billion-dollar Trans Alaskan Pipeline System which would carry it from Prudhoe Bay in the North to Valdez, a warm water port in the South. From there the oil would be carried to the West Coast by conventional tankers.

The pipeline has hit strong opposition from conservationist forces and subsequently from some Government officials. As a result, construction permits have not yet been granted and completion will be delayed to late 1973 or probably beyond.

The discovery of a large oil field in the Mackenzie Delta of Canada by Imperial Oil, a subsidiary of Standard Oil Company (New Jersey) has led to speculation that an ice-free harbor will be built somewhere between the North Slope and the Mackenzie.

The cost of an Arctic harbor has been placed at about \$500-million.

Students of the situation say that ice-breaking tankers could also be chartered to the Canadian oil companies drilling in the Arctic islands and to the mineral companies that have large discoveries on some of the islands of the Canadian archipelago.

Despite the apparent optimism flowing back from the ship, the Manhattan has not had an easy time of it on this trip. She has been holed twice by the ice.

Minor damage was sustained in the hull at the ship's stern

while backing during the tests. This area is protected internally by a watertight bulkhead that was installed around the steering engine space.

Another crack in the hull occurred near the afterpeak, a small compartment at the stern post used for storage of fresh water. This damage and the damage incurred on the summer voyage all took place in areas where new high tensile steel had not been installed.

Humble said that ice conditions encountered on the current voyage proved substantially different from those in the Northwest Passage last summer. On this voyage the ship did not attempt to make a Northwest Passage but rather concentrated on finding ice of uniform thickness in the inlets off of Baffin Island on the eastern end of the Arctic Islands.

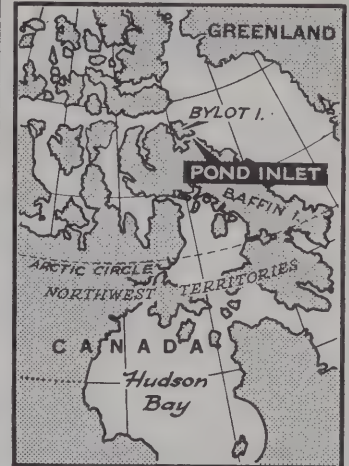
In addition, on this voyage the ice has been more snow covered, which has increased friction on the ship's hull.

While the Manhattan has been fighting the ice trying to prove the practicality of surface shipping in the Arctic officials of the General Dynamics Corporation have been in Canada trying to convince the Canadian government of the feasibility of giant submarine tankers.

Samuel B. Winram, director of General Dynamics' undersea research section told a Canadian House of Commons committee that giant submarine tankers would be "competitive" with surface tankers and would be far safer.

Mr. Winram said a decision would be made within eight months on whether to go ahead with development of a submarine tanker. If approved, he predicted it would cost about \$3-billion to build five or six submarine tankers and port facilities for them.

The Manhattan Slowed By Heavy Arctic Ice



The New York Times May 9, 1970

DARTMOUTH, Nova Scotia, May 8 (Canadian Press)—Heavy ice north of Baffin Island has stalled the United States tanker Manhattan and her Canadian escort in their attempt to move through arctic waters, a Transport Department official said today.

Capt. James Cuthbert, the fleet superintendent, said that the Canadian icebreaker Louis S. St. Laurent had reported the ships had been unsuccessful in attempts to reach Navy Board Inlet. The ships had been trying to get into the easterly side of Pond Inlet when ice forced them to halt. The voyage which began in April, had been expected to end about May 15, but will likely be delayed by ice conditions.

Laurent, with 24,000 shaft horsepower, is nearly twice as powerful as the John A. MacDonald, the icebreaker that helped the Manhattan through some ice-clogged passages last summer.

Capt. Paul Fournier, commanding officer of the St. Laurent, will also be the principal Canadian representative on the voyage, and officials said, would be the one to decide when the Manhattan might be encountering dangerous ice conditions.

Transport officials said, however, that the eastern Arctic was relatively clear of the hard ice pack that forms in the western waters. This gave the Manhattan trouble last year.

The Manhattan will not try to penetrate the entire route this time. She will cruise the eastern area without a planned course to test her ability to navigate through ice in various stages of formation and disintegration.

Supertanker Accepts Canada's Rule on Pollution

The New York Times

OTTAWA, March 28—Canadian transport officials said this week that the United States owners of the supertanker Manhattan had agreed to all of the antipollution requirements set by the Government for the vessel's second scientific cruise in the Arctic next month.

This is believed to have paved the way for the voyage that the huge vessel is scheduled to begin about April 4 from Newport News, Va. The Manhattan, which made historic westbound and eastbound trips through the Northwest

Passage last summer, will head for Baffin Bay and the waters of the eastern half of the Canadian arctic archipelago.

The External Affairs Department had previously informed the Humble Oil Company, which owns the Manhattan, that the Canadian Government would agree to the second voyage provided anti-pollution safeguards were guaranteed.

The Department of Transport presented a list of 24 regulations concerning equipment and personnel. These had to do with the stowing of oil

needed for fuel during the long voyage. The rules stipulated that the Manhattan be accompanied by ice breakers and that the Manhattan have pumps to remove oil safely in the event of a mishap.

According to Ottawa officials the Humble Company has agreed to carry insurance to pay the cost of cleaning up any pollution that might result from the voyage. It became known today that the St. Laurent, a powerful new Canadian icebreaker, will escort the Manhattan through the waters that Canada claims. The St.

ONLY HUMAN

Travels in Arctic Circles

All the important things Max Clifton Brewer has in the world—wife, children, work—are around the Arctic Ocean. He's been there for 20 years.

Brewer runs the U.S. Naval Arctic Research Laboratory at Pt. Barrow (pop. 320), which is 330 miles above the Arctic Circle. He is also professor of ice physics at the University of Alaska, located in a town called College, near Fairbanks.

We met recently when he came here to receive the Edward Cleaveland Sweeney Medal from the Explorers Club for his contribution to knowledge of the Arctic.

"People tend to confuse the Arctic, which is one of the world's major oceans, with the Antarctic,



Max Brewer—Oceanography on the rocks.

which is a major continent," said Brewer, 45, tall, lean, a perpetual pipe smoker. "The Arctic has depths up to 17,880 feet with an eight-foot skin of top ice that's moving constantly."

His eyes glowed. "That ice is a living, breathing thing; closing, making pressure ridges; opening into leads of water, some pencil thin, others 50 miles wide, all the way up to the North Pole. The Arctic is endlessly fascinating. Unless we know its environment, we can't utilize it. That's what got the 48 states into their pollution mess."

He was married at Pt. Barrow. His wife, Marylou, came there from Seattle to work as a nurse in the Alaskan Native Service. They now have two sons and three daughters, from 8 to 15.

"For 10 weeks in the summer, the children go south to terrorize their grandmothers," said Brewer. "One grandmother is in Spokane and the other in Elmhurst, Ill."

Up his way, the snow is off the ground from mid June to mid September. Summer heat has climbed to the 70s. The average in July is 38. Arctic winter lasts nine months and drops to minus 20 and even minus 30. The sun slips below the horizon on Nov. 19 and isn't seen again until Jan. 24. Everyone lives in a combination of twilight and darkness.

"It tends to depress natives and non-natives alike," said Brewer. "The secret is to keep busy 110% of the time."

Wives of the lab men are required to work three full days a week. Mrs. Brewer is the official librarian and the unofficial nurse. Other women do everything from working as lab technicians to conducting after-school reading classes.

"It keeps them from getting cabin fever," Brewer said. "The women do mention after a time that they miss their families back south and shop-

ping. So we create interests and entertainment of our own. Last week, as a change from the Arctic atmosphere, we had a Pintada, a Mexican party, with Mexican food."

And the children? What do they do?

"What children do everywhere. Movies. We have them three times a week. Visit each other. TV. Radio. Records. Noise. The younger ones are out playing in the snow. If there's no wind, they can stay out for half a day. If it's windy, only for 15 to 30 minutes. But, then, kids in Montana and Wyoming can't stay out in the winter wind, either."

He admitted there are a few problems: recreation for the teenagers; sending them south to high school. But there's no pot and no delinquency. There is the "psychology of impermanence" among non-natives: no one really looks after a place unless it's a permanent home. After 20 years, isn't he ready to retire and move south?

"Me? Retire? When they pat me in the face with a spade. We'll stay. Mrs. Brewer and I, we like it. We get south two or three times a year. Your big cities, they're nice to visit but . . ."

He was born in Black Falls, Alberta, Canada, of American parents, and raised in Spokane. Two years before he was graduated from the University of Washington in St. Louis, Brewer spent his summers working for the U.S. Geological Survey around Fairbanks and Pt. Barrow. After graduation in 1950, with a degree in geological engineering, he returned to the Arctic to study lake and river ice and permafrost, the permanently frozen ground.

"It was best to use it, not fight it," said Brewer, who designed roads and airstrips with the permafrost as the foundation.

In his early Arctic days, he was away from the lab half the winter, designing and establishing ice stations and operating them. One is 360 miles south of the North Pole, only a huge platform of ice, 100 miles long, six miles wide, three miles deep, from which scientists conduct research in such things as oceanography and marine biology.

"Instead of using a ship, we use a big piece of glacial ice caught in the polar pack," said Brewer. He's been on it often.

The lab was opened in 1947. He was named its director in 1956. It has its own machine and electrical shops, a fleet of tractors, six planes, and a support staff of 75, of whom 45 are Eskimos working as technicians, mechanics and maintenance men. During the year from 40 to 140 scientists arrive for a short visit or a year-long stay. A fairly regular visitor is Dr. William Steere, director of the N.Y. Botanical Garden, and his wife, who processes and mounts all the botanical specimens her husband collects. The researchers work at Barrow or at any of the lab's 20 field stations, which stretch from the Canadian border to the Bering Sea and from the Arctic Ocean to Brooks Range.

Brewer brought continuity to their work. They've created a fuller understanding of the Arctic's oceanography, a knowledge vital to construction, especially of the DEW Line and, more recently, the information that made possible a rapid exploration of the vast oil deposits around Prudhoe Bay without costly mistakes.

They've added considerably to the knowledge of marine biology, limnology, geophysics, glaciology and the physiology of Arctic animals. They're still intrigued by the wonder of hibernation. What allows an arctic animal to stop eating, exercising or performing other body functions for months?

"The answers would be important to any deep space probe," Brewer said. "Could astronauts be made to hibernate for six months to a year while traveling to Mars or Mercury?"

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COAST GUARD CHECKS ICE ISLANDS' SHAPE

WASHINGTON—The United States Coast Guard has completed a research project, in cooperation with the University of Alaska, at Prudhoe Bay, Alaska, to describe the underwater shape of one of two ice islands grounded off the bay for the last two winter seasons.

The islands are each the size of a football field. The oil industry is interested in ice islands as research platforms from which to study the design of offshore structures that support drilling equipment and docking terminals for supertankers.

The Coast Guard's interest lies in port and harbor development and maritime transportation in the arctic.

Dr. Lloyd Breslau of the Coast Guard's Office of Research and Development and Lieut. Michael Trammell of the Coast Guard's Polar Operations Branch, used an experimental technique employing a side-looking sonar to obtain vertical profiles of the underwater sides of the ice island. Eleven sites were chosen around the ice island, holes were drilled and the sonar was lowered through the ice. The sonar was then raised while recording the horizontal distance to the ice island.

ALASKA TOP SOURCE OF PLATINUM IN U.S.

WASHINGTON — Although the United States ranks fourth in the world in the production of platinum metals, domestic sources of these rare metals are very limited, and concentrated mostly in Alaska, according to a report by the Geological Survey of the Department of the Interior.

Dr. Harold L. James, chief geologist of the survey, said "the report summarizes the principal data on deposits for use by geologists, mining engineers, and industry, and should be of interest to the general public as well."

Platinum was first discovered in placer deposits in Colombia in the 16th century, and mining began there in 1778. These deposits were the only source of platinum until deposits were discovered in the Ural Mountains of Russia in 1822. There are six metals in the platinum family: platinum, iridium, osmium, ruthenium, rhodium, palladium. The major sources of platinum are lode deposits in the Soviet Union, South Africa, and Canada. Important placer deposits occur in Colombia, Alaska, and also in South Africa.

Naval Research Official Warns on Alaska Pipeline

The New York Times

WASHINGTON, May 5—The head of the Naval Arctic Research Laboratory has warned an Alaskan Senator that the proposed trans-Alaska oil pipeline might break and wreak great damage to the environment.

In a letter to Senator Theodore F. Stevens, Republican of Alaska, the laboratory head, Max C. Brewer, said he had found "inconsistencies" in documents prepared by the consortium that plans to build the pipeline. He also praised a group of Government geologists and engineers whose findings conflicted with those of the consortium.

If the Nixon Administration approves the consortium's plans, Mr. Brewer said, the result could be "a 90 per cent successful pipeline." That, he said, is something "neither the Government, TAPS (the Trans-Alaskan Pipeline System) nor the newly aroused public can afford."

Mr. Brewer's letter was based on a review of the proposals of TAPS and criticisms of those proposals made by geologists and engineers at the Menlo Park, Calif., station of the United States Geological Survey.

TAPS, an unincorporated group of eight companies, proposes to build an 800-mile pipeline from the recently discovered oilfields at Prudhoe Bay on the Arctic North Slope to Valdez, a warm seaport.

On March 23, the Menlo Park group criticized the consortium's plans for burying in the permafrost all but about 50 miles of pipe, which would carry oil at 155 to 180 degrees Fahrenheit. The group was particularly critical of plans to construct only about seven miles above ground in the 75-mile stretch of the Copper River Basin.

In this basin, the permafrost contains ice wedges and lateral blocks of ice called lenses that if melted could run off or could turn silt into a semiliquid, leaving the pipe without support and thereby risking breaks and large oil spills.

Mr. Brewer, after alleging "inconsistencies" in the TAPS documents, noted that they "indicated potential settlements [of soil] of as much as 11 feet for a buried line" at points in the Copper River Basin. Further, he said, the consortium conceded that "differential settlements" of 5.5 to 7 feet could be expected. A differential settlement is the difference between settlements at two points relatively close together.

However, Mr. Brewer quoted from one of TAPS's own documents that the "TAPS present design allows soil differential subsidence for the buried pipeline not to exceed one foot in 100 feet of span length."

In short, the expected sag was much greater than the allowance sag.

The consortium's conclusion, Mr. Brewer said, "appears to be that the soil not subject to settlement over a few feet would periodically support the pipe much as a piling would." He asserted: "This appears to be a questionable conclusion."

Moreover, Mr. Brewer said that TAPS had not even discussed other areas with potential permafrost problems—"The Tanana Valley, Minto Flats and particularly the North Slope."

Second, Mr. Brewer said, the consortium had not treated erosion "as a serious matter" and when discussing free water from melting the permanent frost had not considered added water from melting spring snows or summer rainfall. Further, he said, TAPS had not dealt with thaw of permafrost and erosion caused by disturbance of the tundra by construction.

Third, he said the consortium's plans called for placing the above-ground sections of the pipe only four feet above the surface. This, he said, would interfere with wildlife movements, particularly caribou migrations. By contrast, he noted that the Soviet Union elevates natural gas lines in wilderness areas to 15 to 20 feet.

The proposal of TAPS was submitted last Feb. 20 to William T. Pecora, director of the United States Geological Survey and chairman of the Technical Advisory Board created by Secretary of the Interior Walter J. Hickel to monitor the plans. Mr. Pecora turned the documents over to the Menlo Park working group.

Senator Stevens has supported the consortium's request for Mr. Hickel to expedite right-of-way permits for the pipeline and a 390-mile service road from the Yukon River to Prudhoe Bay.

Because of the conflict between TAPS engineers and the Government geologists, Senator Stevens wrote to Secretary of the Navy John H. Chaffee. He asked Mr. Chaffee to have Mr. Brewer review the consortium's proposals and the working group's criticisms. The Arctic Research Laboratory, which Mr. Brewer heads, is run by the University of Alaska under

naval contract.

Mr. Brewer's letter to the Senator was dated April 24. In it he said that the Menlo Park group "probably is the most experienced group, knowledgeable about the Alaskan environment, within either the state or Federal service."

The pressure for the permits and the differing philosophies of the two groups have created a polarization, Mr. Brewer said, explaining:

"TAPS seems to feel that they have built pipelines all over the world (except in permafrost) and hence wants to go full speed ahead. The Technical Advisory Board, on the other hand, feels it is providing environmental expertise in order to protect both the public interest as regards environmental well-being and TAPS chances of successfully engineering the pipeline."

Alaska Oil Boom Produces a Crisis In Unemployment

WASHINGTON, May 23 (AP) —An influx of job seekers, lured by an oil boom, has created an unemployment crisis in Alaska, according to Senator Ted Stevens.

Unemployed residents of the other states are rushing to Alaska to find new jobs and are adding to existing employment problems, the Alaska Republican said in an interview.

Alaska, which has traditionally welcomed newcomers, is now urging job seekers to stay away until they have secured work in the Northern state.

Court injunctions obtained by conservationists have stifled the North Slope oil boom and prevented an expected employment increase in Alaska, he said.

The court orders are holding up construction of a billion-dollar pipeline, across road and pulp mill at Juneau.

As a result, he added, oil well drilling has fallen off and the state has an unemployment rate of over 12 per cent.

"In places like Bethel and Dillingham," he said, "85 per cent of the workers are jobless. Fairbanks has 1,800 people waiting for work. Anchorage has as many."

"We just don't have enough transient housing and metals and the people can't build houses without jobs," he added.

The state is setting up information booths at border stations and airline terminals to urge job-seekers to stay away.

Oil Executive Sees More Finds In Alaska if U.S. Aids in Risks

PARIS May 29 (UPI) — An American oil executive warned today that American dependence on foreign petroleum would increase unless the United States Government helped tap further resources in the Alaska region.

Rollin Eckis of Los Angeles, vice chairman of the Atlantic Richfield Company, said that if the Government maintained the incentives for the large risks involved with exploration in the Arctic, "there is every reason to believe that significant additional reserves will be discovered on the North Slope" of Alaska.

Addressing an oil symposium of the Organization for Economic Cooperation and Development, Mr. Eckis said that "much more oil must be found in our country to accomplish the objective of reducing United States dependency on foreign supplies." He added that according to available information, between 12 and 15 billion barrels of oil have been

discovered so far on the North Slope of Alaska.

He said that "it is apparent that the oil reserves discovered to date in Alaska are not sufficient to reduce the increasing dependency of the United States on imported oil."

Mr. Eckis stated that 1980 United States consumption will amount to 20 million barrels daily. Thus, a supply of 15 billion barrels now discovered on Alaska's North Slope would satisfy only two years' consumption, he added.

Robert B. Nickolas, manager of the company's corporate planning department, came out strongly in favor of building a trans-Alaska pipeline as the most direct and lowest cost route to deliver the badly needed new oil resources in time. "The larger the portion of the United States supply gap that is filled by Alaskan oil, the less dependent the United States will be on oil from other countries in times of emergency," he stressed.

Eskimo Can Give Peace Lessons

By JAMES G. CAHILL
Paterson News

CAMBRIDGE BAY, Northwest Territories, Canada — The Eskimo is a charming person, bubbling over with laughter, affection and community concern.

For more than 2,000 years, since his possible migration from Asia, the Eskimo has managed to survive with only primitive implements in an environment where until only recently the civilized visitors, with all his technical skills, could scarcely exist for a season.

Despite his daily battle for survival in an icebox area where temperatures combined with the chilling wind factor have dropped to 100 degrees below zero, the Eskimo has found time and energy to develop a civilization and pattern of living that in many respects far exceeds the best achievements of most of the human race.

The Eskimo has no history of warfare, either in his own tribe or with his Indian neighbors to the south, yet he is capable of resisting aggression as explorer Martin Frobisher discovered much to his regret more than 400 years ago.

Dishonesty is almost foreign to the Eskimo's nature and he has developed community co-operation to a degree seldom achieved by other more ma-

terialistically oriented people.

Working with native stone, ivory and whalebone, the Eskimo has achieved a sculpture that is world famous, acclaimed as creative, individualistic and imaginative.

Originally the Eskimo was a nomadic, maritime hunter, going wherever the game took him. He hunted the polar bear for food and fur, the walrus for food and ivory, and the seal for food. He used the seal skins for tents, clothing, and seal oil for cooking, light and heat. When he found caribou, he ate the meat and wore the skins.

And when he hunted for food he took his family along and built an igloo each night he stopped to rest.

Since the Canadian Government made the Eskimo a ward of the state much of the primitive way of life has vanished. The overnight hunt is a thing of the past and the tent has been replaced by box-like structures with oil stove heat.

There are 7,000 Eskimos in Canada. Here in Cambridge Bay, 175 miles north of the Arctic Circle, 600 Eskimos live in the largest settlement in the Canadian Arctic.

The settlement is "downtown" to the personnel of the main station of the Distant Early Warning System, two miles away. It was construction of the vital radar site one in a link of 30 to protect the North American continent from a surprise air at-

tack, that increased the importance of historic Cambridge Bay. Now there is a nursing station, a federal school, a weather and radio station and a number of government offices.

A Hudson's Bay Company store is located in the settlement. It is a cooperative where the Eskimo sells his fish, animal skins and his sculpture. For the Eskimo on hard times there is a welfare check, a threat to the centuries-old rugged independence of the Eskimo.

With the introduction of cash without work, some of the Eskimos have gone heavily into debt. They have purchased snowmobiles and other luxuries and ride carefree through the settlement and on the ice of Cambridge Bay not knowing when they'll be able to pay their bills — and not caring.

Three families are housed at the radar base where the husbands operate "Cat" tractors and other heavy equipment. The Eskimo has an immediate adaptability to this type of work. ITT's Arctic Services, Inc., of Paramus, N.J., operates, maintains and supplies the base.

Two of the best-known residents of the settlement are Father Andre Metayer, French priest who has been teaching the Eskimos for 31 years; and Miss Kayy Gordon, 35-year-old evangelist, whose Good Tidings Church is a gathering place for young people who sing as she accompanies them on the guitar.

At the Royal Northeast

Mounted Police station, a sergeant said the only natives locked in the cell overnight are those who are "impaired." In the language of the north this means intoxication. There are no other law violations, except an occasional running of a stop sign by a youngster in a snowmobile.

The older Eskimos call the North Pole "tigi-su," which means "big nail." The name was the result of hearing white men who sailed into nearby waters express their interest in a pole to the north which the natives believed to be a huge iron spike driven into the earth.

The older men have such exotic names as Munga, Agvil, Omingmak and Tootalek.

Their children who attend school and buy rock records at Hudson's Bay Company store have such Christian names as Peter, Mary, Richard, Philip, Jean and Allen.

Allen Kadlum, who was looking over the stock of records on a counter next to a pile of skins, is 14 and speaks English.

"In your story," he said, "call us Innuits. This means people, which we are. Eskimo is a Cree Indian term meaning raw meat eater. In the igloo years my people ate raw meat. Now that we are in a civilized village we cook it."

WALNUT SHELLS AID ON SNOWY RUNWAYS

FAIRBANKS, Alaska (Reuters)—Walnut shells are helping to speed the development of new oil strikes in northern Alaska.

The shells are strewn on snow-covered landing strips to help jet aircraft brake safely and deliver oil-drilling equipment.

An airline official said that sand or gravel would be sucked into the jet engines and damage them and that walnut shells "are the best thing you can use."

When the days start to lengthen after two months of Arctic darkness, it comes as a mixed blessing to those involved in the oil rush.

There are 14 hours of daylight for air deliveries or tractor trips overland, but the increasing number of sunny hours threatens to melt the ice-hardened air strips and roads.

So Interior Airways, an intra-Alaska line, withdraws all of its passenger flights at such times to concentrate on freight-hauling to the oil area. It also uses its five huge Hercules transport aircraft to fly fork lifts, dump trucks and even mud used for drilling to the area.

The big-bellied planes make between three and six return trips each 24-hour day to the northern slope sites 500 miles north of Fairbanks.

ARCTIC PACT SOUGHT BY U.S. AND CANADA

The New York Times

OTTAWA, March 21 — U. Alexis Johnson, Under Secretary of State, conferred here yesterday with Canadian Cabinet Ministers on differences between Washington and Ottawa on sovereignty of Arctic waterways.

Prime Minister Pierre Elliott Trudeau holds that the waters as well as the islands in the North American Arctic region belong to Canada. The State Department concedes ownership of the lands to Canada, but contends that the waters around them are part of the high seas, and that the Northwest Passage is an international waterway.

The issue, long an academic one, has become real with the discovery of oil deposits in Arctic fields, and the voyages of the United States tanker Manhattan testing possible sea routes to East Coast markets in the United States.

Mr. Trudeau has declared that Canada must control navigation through the Northwest Passage because she has a primary responsibility to prevent pollution of Canadian territories resulting from exploitation of Northern resources.

Many Deep Freeze Items Developed by Laboratory

PORT HUENEME — Polar equipment and accessories developed or advanced by the Naval Civil Engineering Laboratory (NCEL), here, dominate the "Buy" list for Antarctica's Deep Freeze '71, according to E. H. Moser, director of NCEL's Polar Division.

Civil engineering supplies and equipment for Deep Freeze 71 are currently on order within the Defense Department. The list for Antarctica includes 27 line items, or 56 pieces of equipment. Twenty-three of the line items, or 50 pieces of gear incorporate numerous NCEL advancements. Six of the line items were developed by the Laboratory. Two are spin-offs from earlier NCEL work. Five were proposed and evaluated by NCEL for Antarctic use. In addition, 21 of the line items use winterization procedures developed by NCEL. Thirteen use high-flotation, low-pressure tires introduced in Antarctica by NCEL during Deep Freeze '64.

NCEL traces its activity in the area of polar engineering to the Bureau of Yards and Dock's Proving Ground, Port Hueneme, a post-World War II

activity which merged with NCEL in 1949. The Proving Ground tested equipment in the high Sierras; and at Camp Hale, Colorado, then later carried on studies at the Arctic Test Station, Point Barrow, Alaska. As far back as 1948 there were 27 Proving Ground projects under way dealing with cold weather engineering.

A decade later the Laboratory established a full fledged Polar Division, with Moser as its first and only director. A year later research was booming at both the North and South Poles. Ice engineering and construction studies were conducted on Ward Hunt Island, near the Arctic Circle, and snow compaction studies were underway in the Antarctic. Ice thickening experiments already underway continued in the sea near Point Barrow.

Problems Accompany the Gains of Canadian Eskimos

By EDWARD COWAN

The New York Times

TUKTOYAKTUK, Northwest Territories—Willy Felix, who is 19 years old, is a blocker in the Tuk Fur Garment factory.

Lilly Louie, 23, is a stewardess with Great Northern Airways.

John Steen, 36, is Great Northern's agent here, operates his own taxi and freight-handling business and is the chairman of the new hamlet council.

All three are natives of the western Canadian Arctic. All three are full-time, year-round participants in the wage economy.

They are the vanguard of a new generation of Eskimos, Indians and persons of mixed native and white parentage. Although the young people have greater economic opportunity, they are beset by serious social and psychological problems.

The new generation knows more about technology, about how the white man does business, about the world beyond the Mackenzie River delta. It is a better-educated generation than its parents', although not well-enough educated by the standards of southern Canada: the standards of oil and mining companies that find few natives of the north qualified for employment.

But federal officials in Ottawa say that the oil companies have become increasingly willing to hire and train natives for camp maintenance and similar jobs. The oil industry, they say, has been more active in this respect than the mining industry.

Last autumn the Government signed with Pine Point Mines, near Hay River, Northwest Territories, and with the United Steelworkers of America what Ottawa hoped would be the first of a series of agreements for subsidized on-the-job training of native workers.

W. Bruce Hunter, general manager of the Government-owned Northern Transportation Company, has said that his company's efforts to employ Eskimos and Indians "have been extremely successful" in Tuktoyaktuk, but "where there are liquor outlets our experience has not been quite so good."

Eskimos and Indians who seek a good life in the wage economy have an additional handicap:

In addition to the lack of education—Miss Louis, who has some grade 11 and 12 credits, is the best educated of the



The New York Times

Lilly Louie, a stewardess with Great Northern Airways, one of new generation in the Canadian Arctic.

three delta natives mentioned— young Eskimos and Indians lack the family connections that often help a white obtain a job.

The natives of the western Arctic are the most socially advanced of any in the Canadian north—that vast sweep of territory from ocean to ocean north of the provinces that includes the Yukon and Northwest Territories.

In the century after Alexander Mackenzie's exploratory voyage in 1789 down the river named for him, he was followed by fur traders, missionaries, merchants, the Northwest (now Royal Canadian) Mounted Police and, in the 20th century, teachers and civil servants.

The opening up of the colder, more forbidding mountainous terrain of Baffin Island in the eastern Arctic, and of very remote central Arctic places, such as Pelly Bay, which even now is accessible only by air or dogsled, began decades later.

The difference is immediately noticeable in the widespread ability of Mackenzie

delta natives to speak English easily and without shyness. Adult Eskimos in the eastern Arctic who can converse in English are a rarity.

Miss Louie's father worked in the powerhouse at Aklavik. Mr. Felix's father is a truck driver. Mr. Steen's father was a trapper from Texas who came north and married an Indian.

The oil exploration boom in the western Arctic is creating more jobs—if not with drilling and seismic crews, then unloading the barges that carry supplies down river in summer, building motels for the expanding tourist trade, or driving taxis, serving food or making up hotel beds.

The Tuk Fur Garment factory, said Ernest Latour, who instructs new workers, expects to double last year's sales of \$180,000 within a year or two and to double its work force, now 29. Founded by the Government, it will become an employee-owned cooperative on July 1.

Despite all this economic expansion, there are serious social problems in the Mackenzie Delta.

Even, or especially, in Inuvik—the planned, 10-year-old Government-built showcase town—although unemployment is low, social discontent is widespread. Alcoholism, the scourge of most Indian settlements and some Eskimo communities, is the most obvious sign.

The Rev. Douglas Dittrich, Inuvik's Anglican minister, has organized an all-day seminar on alcoholism for April 11. Inuvik also has a new drop-in center for natives who want to stop drinking.

"The natives," Mr. Dittrich said in an interview in his cheery home filled with books, plants and three little children, "are in the wage economy but not of it. They are in a bewildering situation. There is a vast amount of activity, of change going on, which the natives can't grasp. We've pushed them down and made them feel small, that they don't have much to offer."

Mr. Dittrich, who comes from Toronto and spent five years in the eastern Arctic before coming here two and a half years ago, said: "The people do have things to contribute. But they are inhibited from expressing themselves because they've been submerged by another culture. If you're a native you're unsure of every move you make because everyone else seems to know more than you do. The native employee is afraid to ask his boss questions because he'll

feel stupid. So, he doesn't ask and he makes mistakes."

The cultural chasm can be seen in the housing arrangements of Inuvik. The whites live in the east end in houses and apartments served by a system that provides heat and water and carries off sewage. The smaller Eskimo houses in the west end are not served by this facility.

In Yellowknife, the capital of the Northwest Territories, and in Whitehorse, capital of the Yukon, local observers say that young Indians hate whites. They harbor "real bitterness and hostility," said Kenneth McKinnon, a 32-year-old political scientist and businessman who is an elected member of

the Yukon Territorial Council.

Jean Dittrich, the Inuvik minister's ebullient wife, believes "it's not a racial problem, it's a poverty problem. Essentially what you've got here are the social conditions you've got in any slum."

"There are two distinct social groups in the community and never the twain do meet," the Anglican clergyman said.

There is evidence that even among natives who are "making it" in the wage economy there is hostility toward whites. Among whites, casual, slighting remarks about the natives are not uncommon.

The price of education and adaptability to the white man's ways may be a cultural rootlessness that contributes to what Mr. Dittrich called the "fairly low" morale of most Inuvik natives. That assessment is shared by social workers.

Colin Amos, a toothless man who is 37 years old but looks 10 years older, is employed by the Government in a nonskilled job and has seven children. In his home the other evening, he explained that he cannot take his 16-year-old son trapping in winter because the lad is too busy with basketball and badminton in the high school gym.

Mr. Felix, who earns up to \$200 a month on piecework in the fur factory, said he gave away his dogs. "It was too hard to take care of them," he explained.

"By the time I was old enough to trap, about 6, I had to go to school," he said. "Trapping is like anything else. You have to grow up with it. I hunt but I don't trap, I'm not a very good shot either."

The less-educated Eskimos of the eastern Arctic, said Mrs. Dittrich, have retained more of their traditional "self-reliance," but the western Arctic Eskimos "fit in better."

Canada Seeks to Prevent Damage to Arctic Lands

By EDWARD COWAN

The New York Times

OTTAWA, May 23 — The Canadian Government, with help from industry and universities, is pouring money and talent into a program to protect the Arctic environment from what a Cabinet minister has called "the evils of uncontrolled exploitation."

Land-use regulations to come into force this year are aimed at preventing the sinking of fragile Arctic soil that can result from the improper use of bulldozers or other heavy vehicles.

Legislation to authorize the regulations was introduced in the House of Commons last week. Government lawyers are putting the regulations into final form after nearly a year of drafting in consultation with industry spokesmen and conservationists.

Separate legislation is intended to prevent pulp mills, mines and other industrial users of water from polluting the streams of the Yukon and Northwest Territories. The 1.5 million square miles of the two areas account for 40 per cent of Canada's land mass. The Government lacks jurisdiction

in the provinces, some of which have been making their own efforts to avert environmental damage.

The Department of Indian Affairs and Northern Development has established a 10-man task force of officials, conservationists and representatives of three major oil companies to examine environmental problems associated with resource development in the Arctic. The group recently visited Tuktoyaktuk Peninsula in the Western Arctic, where hundreds of men are drilling for oil and making seismic surveys. An oil company provided an airplane to transport the group.

The department is recruiting the first 25 members of a new 50-man northern conservation service. Many of the applications have come from young people in the United States, some of whom may be hired.

The budget for the department's water, forest and land divisions has gone up to \$3.5-million this year from \$2.5-million last year. Further increases are planned.

An Arctic land-use research program is getting under way. Preparations also are being

made for summer field trials of new types of track vehicles, designed to minimize damage to the fragile Arctic tundra. If bulldozers or track vehicles scrape off or compress the insulating top layer of moss on the tundra, the ice of the permanently frozen subsoil, or permafrost, may melt, resulting in the sinking of the soil as much as several feet. The phenomenon is known as thermokarst.

The department's efforts are part of a larger campaign of Arctic environmental protection to which Canada committed herself last month when Ottawa announced plans to avert oil pollution of Arctic waters. The Government's declaration that it would apply pollution-control measures within 100 miles of land, over waters traditionally regarded as high seas, brought a protest from Washington and support from all parties in Parliament.

In the House of Commons last week, the Minister of Indian Affairs and Northern Development, Jean Chrétien said that the Government would enforce the new land-use regulations strictly.

"We are determined that the North shall not fall victim to the evils of uncontrolled exploitation," Mr. Chrétien declared.

The land-use regulations have gone through five drafts since last summer. Mr. Chrétien hinted that his patience was wear-

ing thin. If the regulations are not acceptable to oil, mining, timber and conservation representatives, he said, "the Government must and will accept its responsibilities."

The burden, he said, is on "those who wish to extract raw materials to find out and tell us how they can operate within the Government's land-use regulations and without damaging the delicate northern eco-systems."

Under the proposed land-use regulations, the territories will be divided into five zones, according to their susceptibility to damage, the land within each zone will then be subdivided with the most susceptible areas designated, with specific criteria for operations. To get a permit to operate in these areas, a mining or oil company will have to spell out precisely how it proposes to operate—what sort of vehicles it will use, how it will prepare airstrips and roads, how fuel dumps will be situated, the season in which work will be done and so on.

Outside the stipulated areas permits will not be needed but the more general land-use criteria will apply.

Violations could lead to a penalty of \$5,000 a day, and field inspectors will have the authority to order a halt to all work, as was done recently for the first time in the Old Crow area of the Yukon.

Polar Bear Breeding Area Found

The New York Times

OTTAWA, May 23—Biologists have identified in northern Manitoba what they regard as one of the most important polar-bear denning, or reproduction, areas in the world.

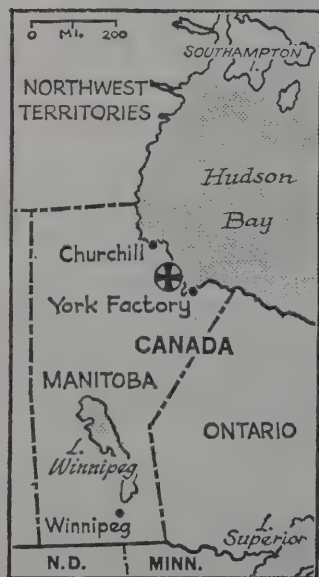
It lies on the southwestern shores of Hudson Bay, about 100 miles south of Churchill and 40 miles north of York Factory, an abandoned trading settlement.

The area is said to be one earmarked by oil companies for exploration. Biologists fear that the exploration, if not properly regulated, could upset polar-bear reproduction. About 60 female bears are believed to have reared young there this year.

The Canadian Wildlife Service here, said, that the most important single denning area in the world has been the Soviet Union's Wrangel Island, where about 60 females a year are believed to give birth.

It also cited Southampton Island in the northern reaches of Hudson Bay and Kong Karls Land north of Norway as major denning places.

In dens, cave-like holes,



The New York Times May 24, 1970

females give birth in winter, most commonly to twins but sometimes to single offspring and occasionally to triplets. The new-born cubs weigh only one pound or so and grow to about 1,000 pounds.

Tests on Polar Bears Show Residues of DDT in Canada

EDMONTON, Alberta, Oct. 18 (AP)—Preliminary testing of Canada's polar bear population in the high Arctic has disclosed unexpectedly high concentrations of DDT residues in some animals, Dr. Charles J. Jonkel of the Canadian Wildlife Service in Ottawa said at the Canadian Tundra Conference this week.

The insecticide concentrations were found in fat samples taken from polar bears killed in a remote Arctic region, according to Dr. Jonkel.

"We are now selecting groups of samples for further analyses from five regions of the Canadian Arctic," the doctor told delegates at the three-day conference on productivity and conservation in northern circumpolar lands.

"The surprising discovery of high insecticide levels in fat tissue of polar bears deserves special attention. We plan to determine these levels for dif-

ferent areas of the Arctic by sampling every year."

Canadian Official Lauds Oil Discovery in Arctic

OTTAWA, Jan. 16 (UPI)—Jean Chrétien, Minister of Indian Affairs and Northern Development, has termed a new oil find in the Mackenzie River Delta in the Arctic as significant and encouraging.

The Minister said he welcomed news of a successful oil-drilling test at the Imperial Oil Atkinson wildcat well, on the Arctic coast 40 miles northeast of Tuktoyaktuk. Imperial said oil flowed to the surface from the sandstone zone at a drilling depth of 5,700 feet.

Mr. Chrétien said it would be "premature" to assume the discovery will be commercially exploitable, but he called it "most significant in its demonstration that oil is present in the thick sedimentary wedge underlying the Mackenzie River Delta."

444 Men Sit On Top of the World To Send Warning of Missile Attack

BY JAMES G. CAHILL

THULE, GREENLAND — The world's biggest radar station is strung across the ice on a mountain top on the world's biggest island.

Here, on top of the world 675 miles north of the Arctic Circle, 444 men, modern Paul Reveres, fight the cold war in some of the coldest temperatures in the world.

Primary mission of the Ballistic Missile Early Warning System is to provide long-range detection, tracking and early warning of attack from intercontinental ballistic missiles.

The secondary mission is the detection, tracking and maintaining surveillance of all satellites in space.

New warning systems became necessary in the mid-fifties when ballistic missiles became part of world power arsenals. The U.S. Air Force ordered a study group to begin work on a system which would not only provide sufficient warning of enemy attack for defense and countermeasures, but would, by its very existence, serve as a powerful deterrent.

Out of the study came the "sentinel for survival," the system of three giant radar stations whose overlapping beams would form a high-speed, electronic alarm system extending more than 3,000 miles into space over all the Eurasian land mass from which hostile missiles could be launched.

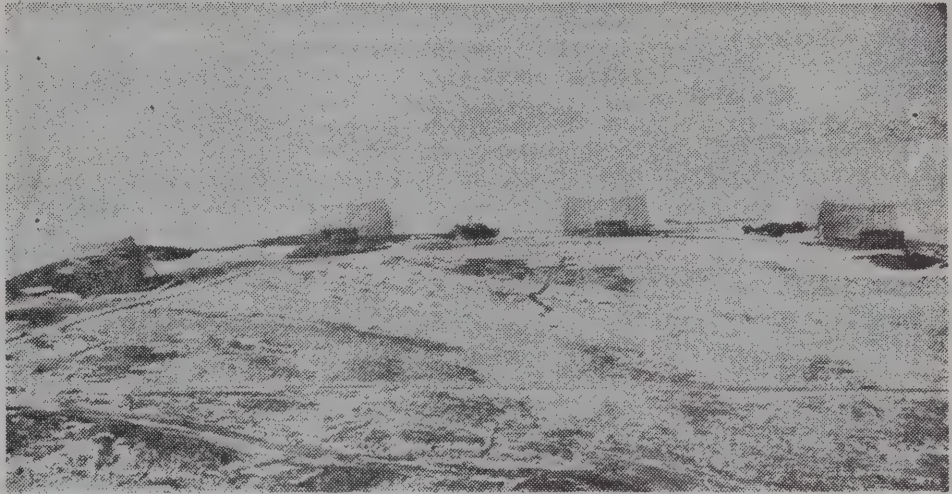
A system to provide the electronic umbrella was built at a cost of nearly \$1 billion.

In addition to the site here at Thule which became operational in October, 1960, there are sites at Clear, Alaska, and Fylingdales Moor, England.

The stations on the North American continent are operated by the Air Force's Aerospace Defense Command's 14th Aerospace Force. The Royal Air Force is in charge of the one in England.

There are 16 officers, 52 airmen and 376 civilian employees of ITT's Arctic Services, Inc. on the job here. Arctic Services, with headquarters in Paramus, N.J. has a contract with the Air Force to operate, maintain and support the North American sites. Some direct technical support is given to the site in England.

Col. Loy A. Butts is the military commander here and Larry T. Howland is site manager. The Air Force men run the tactical operations room; all other activities are carried out by the civilian employees of Arctic Services.



WORLD'S BIGGEST radar station on mountain top at Thule, Greenland. Each of the four screens is bigger than a football field. Any missile piercing the radar beams can be detected instantly.

The station generates 5 million watts for the four radar screens, each bigger than a football field. This energy is bounced against the screens and into space. When it hits an object in space it bounces back to the station.

Computers determine if the signal received is from a missile or a satellite. The radars are so sensitive that they can pick up an object in space as small as a grapefruit.

If the computer signals a

threat from space the warning information is flashed to the North American Air Defense Command at Colorado Springs, Colo. with the speed of light. There special equipment automatically evaluates threat information and displays it instantly on warning panels.

Every satellite ever launched, as well as the debris from satellites that have broken up, is picked up by radar. Operators know precisely at what time the satellites are due to be recorded by the computers.

The vast job of Arctic Services includes stockrooms, warehousing, spares property records and resupply of some 55,600 line items here and 54,300 items at Clear, Alaska; fueling, water supply and hearing at the site here; fire-fighting and ambulance services; transportation; operation of precision measurement equipment laboratories for calibration of equipment and a host of related duties.

It's one of the biggest jobs in the world standing sentinel on the top of the world.

Navy Stations Leave Him Cold

Birger M. Andersen, chief photographer's mate in the navy, said that when he reported to the Atlantic Fleet Combat Camera Group in Norfolk, Va., he expected to be traveling to the ends of the earth.

"I didn't know they meant the extreme north and south ends, though," he declared.

That's how it worked out for Andersen. Within a period of less than eight months, he traveled to the North Pole and then the South Pole while on assignment for the navy.

Andersen, who is head of the still photography division of the camera group, sailed for the North Pole last March aboard the U. S. S. Whale from Charleston, S. C. The Whale surfaced at its destination on April 6 while Andersen was photographing events during the nuclear attack submarine's

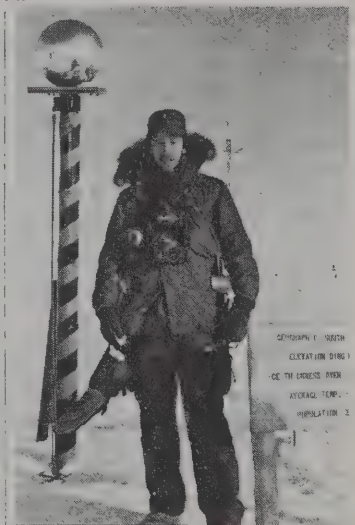
under-ice capability tests.

Coincidentally, the Whale broke through the ice on the 60th anniversary of the discovery of the North Pole by Adm. Robert E. Peary.

After his return, Andersen quickly volunteered for Operation Deep Freeze 1969-70 on the bottom of the earth, and on Oct. 20 he reached McMurdo Station, Antarctica, the largest U. S. station on the continent.

Three weeks later, the chief covered a major event at the pole when he accompanied five female scientists and a woman news correspondent aboard a navy ski-equipped plane to record woman's first visit to the South Pole.

The 13-year navy veteran is no stranger to the polar regions. Eleven years ago he spent a full year at McMurdo



TRAVELER: B. M. Andersen, navy photographer's mate, pauses while on assignment to have his picture taken at the South Pole, seven months after he was at the North Pole.

Sound while participating in 'he navy's Deep Freeze 1959.

The Flight Of the Eagle

By Per Olof Sundman.
Translated by Mary Sandbach.
Illustrated. 383 pp. New York:
Pantheon Books. \$6.95.

By ROLFE FJELDE

In the annals of Arctic exploration, no enterprise seems as gallantly quixotic as S.A. Andrée's ill-conceived and ultimately tragic attempt, in 1897, to reach the North Pole by what was intended to be a navigable balloon. On June 11 of that year, with two Swedish compatriots, Knut Fraenkel and Nils Strindberg, a nephew of the famed dramatist, he cast off from his base camp on Danes Island, Spitzbergen. Immediately, his hydrogen gas balloon, the Eagle, was driven down by its malfunctioning sails to drag the sea, where it lost two-thirds of the guide-ropes that were to have rendered the craft dirigible. Relieved of this indispensable weight, the Eagle rebounded skyward and careened north to vanish into decades of silence, mystery and vain speculation.

Not until 1930 were the facts known. A Norwegian scientific expedition, landing on desolate White Island in the Barents Sea, stumbled upon the last camp site of Andrée's party and recovered his diaries, Strindberg's observation books, photographs and letters and Fraenkel's meteorological notes. The bodies of the men were returned as fallen heroes in a triumphal cortege that passed through city after Scandinavian city and briefly claimed the world's attention.

Now, after many years studying the available records, Per Olof Sundman has provided, in this vivid and engrossing documentary novel, an imaginative re-creation of the events before, during and after the Eagle's fateful 65-hour voyage that is both less than heroic and more than just topically memorable.

The action of the novel is

Mr. Fjelde's most recent book is "Henrik Ibsen: Four Major Plays, Vol. II."

straightforwardly narrated in first person by Fraenkel, the young, jaunty latecomer to the expedition. In a laconic, yet evocative style of impressionistic vignettes and telegraphic sentences and paragraphs, he conveys us from the moment of his commitment to the polar flight in Stockholm, to Paris where he has his initiation in the delicate art of balloon navigation, thence to Spitzbergen for the final preparations, the impatient wait for favorable winds and the hectic launch.

The initial rapid northward progress of the Eagle, followed by hours of aimless drifting, first through the constant mid-summer sunlight, then increasingly through mist and drizzle that freezes as dead weight on the balloon's gondola and rigging, turns out to be only prologue to the forced landing on pack ice and the tortuous 85-day struggle over pressure ridges and shifting floes culminating, finally, in the landfall of White Island. The men by this time are suffering the symptoms of an unknown disease (diagnosed a half century later as trichinosis from infected bears shot for food). As they labor weakly to construct their winter camp, one by one, they die; and the novel snuffs out with the last to go: Fraenkel, felled not by illness, but by the intolerable loneliness of the sole survivor.

Mr. Sundman's theme, in capsule summary, might be phrased as the divergence of magnetic north from true north, in figurative, rather than geodetic terms. The tragic flaw of Andrée and his two companions is that they allow their judgment to be mesmerized by the former, to the fatal neglect of the latter.

The hypnotic attraction of the Pole throws a distorting veil of excitement over all the stages of anticipating and realizing the Eagle's flight. Only when it goes down does true north take over: the harsh, implacable white wastes that mercilessly expose human error and illusion. One of the last and largest illusions is exploded when Frankel learns Andrée had in fact no more ascents to his credit than the nine he himself had made during his instruction in Paris.

These training flights, capturing so authentically the Jules Verne era of aerial adventure,

Eskimos Hunt And Travel On Northern Ice

HUNTERS OF THE NORTHERN ICE by Richard K. Nelson. University of Chicago Press, Chicago. \$8.50.

It started as a report to the Air Force, a guide to survival on the Arctic ice. But it wound up as a full-scale study of a vanishing hunting culture.

Richard Nelson spent the winter of 1964-65 in Wainwright, Alaska, on the Arctic Ocean, and followed up with another stint in the summer of 1966 to round out a year of seasons. He asked some questions, did a lot of listening as the Eskimo hunters, young and old, swapped stories, and kept his eyes open when he went along on their hunts.

But as Nelson points out, the only way really to learn how some things are done is to do them yourself. And that's what he did.

He bought a dog team, built his own sled, made his own lines and harness. He made a full set of ice hunting gear, including a kayak. He joined a regular hunting crew, took his own part in the regular hunts, made his own mistakes and got laughed at for them (ridicule being a standard instructional technique among the Eskimos), he hunted seals at their breathing holes, walrus on the ice floes, whales in the open water.

There are some pretty good polar bear stories, too.

But this is not a personal adventure story. The emphasis is on the Eskimos and their own

hunting techniques as affected by the behavior and habits of the animals they hunt — and, always, as affected by the ice.

Young ice, old ice, piling ice, piled ice, pack ice, drift ice, leads and winds and currents — the ice is the Eskimo's whole way of life, his means of travel and subsistence.

It's dangerous, too. The Eskimo learns to read it and to respect it. Evidently the Arctic ice is much like the American freeway: great if you keep your wits about you, but a killer if you don't.

Nelson's Eskimos are no longer primitive types. Civilization has brought jobs, money, outboard motors, gasoline stoves and lanterns, rifles and shotguns.

But the older men remember and still practice, to some extent, the old ways. In an emergency you can still get heat and light from the old stone lamp, a bowl of seal oil with a wick in it (though the bowl is likelier now to be a tin can). You can kill a seal with a rifle instead of a harpoon — but you still have to throw out something with a line on it to hook him and bring him in.

And nothing has changed the ice.

"Hunters of the Northern Ice" is a serious anthropological study of a disappearing way of life. It's also pretty fascinating stuff for the general reader.

— W. L. Knickmeyer

ESKIMO PHONE BOOK

The Bell Telephone Company of Canada publishes a slim volume to cover northern Quebec, the coast of Labrador, and Baffin and Cornwallis Islands in the Canadian Arctic. Instructions are printed in Eskimo syllabics as well as English and French because 10 per cent of the customers are Eskimos.

THE NORTHWEST PASSAGE: From the Mathew to the Manhattan, 1497 to 1969 is the title of an oversize book being published next month by Rand McNally & Company. It was written by Bern Keating, an Arctic expert and illustrated with full-color and black and white photographs by Dan Guravich. Both were aboard the huge icebreaker-tanker Manhattan in 1969 as she completed the first successful passage by a commercial vessel across the top of North America. Priced at \$9.95.

display the author's powers of evocation at their best: the balloonists gliding silently over all the swarming sounds of the great metropolis to land, miles away, in a pasture, then to be feted with pheasant and wine. It strikes one as quaint and charming, this excursion into

the *belle époque*. The whole story has to be told before one realizes that this spectacle of men, insulated by self-delusion, hearing only what they want to hear, moving inexorably into avoidable disaster, is something of a parable for our own time. ■
New York Times Book Review

The Year Of the Whale

By Victor B. Scheffer.

Decorations by

Leonard Everett Fisher.

213 pp. New York:

Charles Scribner's Sons. \$6.95.

By LOREN EISELEY

In the past 20 years, the family of Odontoceti (toothed whales), which includes both porpoises and the deep-diving sperm whale, have come under intense scientific scrutiny. With the development of ultrasonic echo-ranging equipment in World War II, it became evident, as research continued in the post-war years, that the "voiceless" deep, where sound travels far more rapidly than in air, is far from being the place of graveyard silence it appears from above. Instead, some of its denizens do not only communicate; they navigate by vibrations beamed over a far greater sound range than that comprehensible to the human ear. The Odontoceti are highly intelligent, gregarious mammals who long ago left the land for the sea. In doing so, they have reduced the importance of the eye in favor of new perceptive mechanisms. They *hear*, rather than see, the shape of objects in their world.

Victor Scheffer is a marine biologist associated with the United States Fish and Wildlife Service. "The Year of the Whale" narrates one year in the life of a baby

Mr. Eiseley is the naturalist author of "The Immense Journey" and the forthcoming "The Unexpected Universe."

The New York Times Book Review

sperm whale, a creature who weighs a ton at birth, 60 tons in male maturity, and who alone among sea-going mammals plunges into the enormous pressures of the oceanic abyss. These great beasts are hunters of the giant squid that mankind rarely sees. The heads of the adult whales, in spite of the long scissoring jaws that can chop to bits a ton of writhing tentacles, are scarred over and over, written across like a palimpsest with the marks of endless combat. The krakens of the deep have left their bites and sucker clutches upon the foreheads of their foe. Old harem bulls are slashed and raked by years of combat with rivals.

Yet these huge animals can be gently social; they have been known to buoy an injured comrade up from drowning. A mother will not desert her wounded calf—a fact that remorseless whalers have used to their own advantage. The social ties of the great beasts are contributing to their destruction. Today the herd is traced by electronic devices and scouted mercilessly from the air. The warm-blooded, affectionate instincts forged long ago are now no match for the forces brought against them.

Month by month, season by season, Dr. Scheffer takes his little calf through its first nursing year under its mother's mighty protecting shadow. The author's sea-knowledge is great, his prose poetic and sensitive. In addition, the nostalgic shifting of the starry seasons is gracefully suggested by Leonard Fisher's chapter decorations.

Scheffer knows, as Melville knew, that it is an "unwritten life" he seeks to chronicle. Even the modern zoologist can gain, at best, only glimpses of the lives of these mysterious and transformed creatures. As the book remarks: "A multitude of signals from the world around are constantly reaching their minds through ears, eyes, skin, and doubtless other perceptual channels as yet

undiscovered. The life of a whale is surely complex . . . involving far more than rising to breathe, sinking to feed." It is just this interweaving of the known with the unknown that makes "The Year of the Whale" a volume to be treasured.

Consider, for example, the nightmare pursuit of the giant squid. A sperm whale's head makes up a third of its body. The sonar system by which he reads his passage through the midnight deeps is located somewhere amidst the oils and valves encased in that huge cranium. The whale can detect the presence of an invisible squid in a pressure of 100 tons to the square foot. The brain lobes concerned with sound and its rapid interpretation have squeezed out and overridden the "small brain" of the primitive mammal—just as, in man, the "eye brain" has become similarly predominant.

As the author has perceptively indicated, man is in the process of wantonly destroying a series of highly specialized creatures who might teach us much. Captain Ahab, looking on at the dying attempt of a harpooned sperm whale to hold its head toward the sinking sun, commented sadly, "Life dies sunward full of faith." So ends, in a similar sense, "The Year of the Whale," with the little calf still swimming observantly beside his mother.

His chances for survival are diminishing in inverse ratio to the growth of man's monstrous technology. It is, perhaps, nature's final irony that man himself, for that same reason, may be in the process of taking his last long look at the sun. ■



GREENLAND — The Greenland whale was featured on the 1 Krone definitive which appeared March 5.

The design was by J. Rosing, engraving by Cz. Slania, and printing was recess by the Danish Post Office Printing Office.

FRENCH ANTARCTIC. Engraved airmail stamp marks 20th Anniv of Meteorological Station at Amsterdam Island



RUSSIA. Two multicolored stamps mark 150th year of Antarctic Expedition.



On February 24, Uruguay issued a 250 Peso airmail stamp in a series titled "Fauna." The design by Angel Medina shows an *Arctocephalus Australis* seal; printing was gray, blue and black by Imprenta Nacinal by offset.

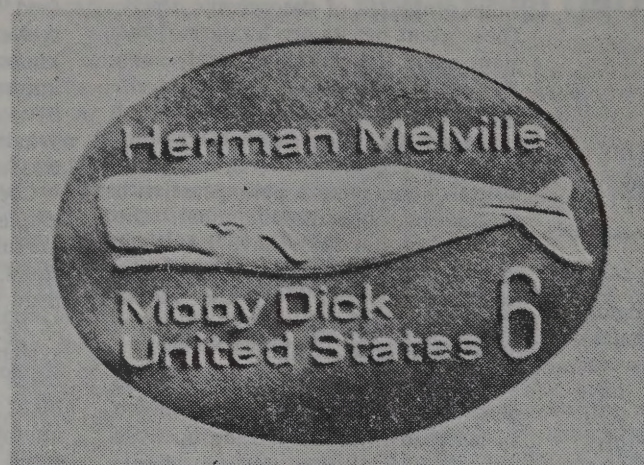
Herman Melville and Moby Dick

"Moby Dick," the fabulous white whale, and his creator, Herman Melville, will be the subject of an embossed envelope to be issued by the U.S. Post Office March 7 at New Bedford, Mass., once the headquarters of the American whaling fleet.

The 6-cent stamped envelope, which will sell for 8 cents, will be the first commemorative envelope to be issued by the Post Office since the one marking the New York World's Fair in 1964.

Designer of the stamp is Bradbury Thompson of Riverside, Conn., artist member of the Citizens' Stamp Advisory Committee. It features a white profile of the whale in a blue oval. The top of the design carries the name "Herman Melville" and the bottom the legend, "Moby Dick, United States, 6," also in white.

Melville was born in New York in 1819 and attended public schools there. In 1837 he shipped to England as a cabin boy. On his return to the United States he taught for awhile before returning to the sea in 1841, signing on the whaler *Acushnet* bound for the South Seas. After 18 months he deserted the ship at one of the Marquesas islands in the



This is the design of the commemorative envelope which the United States will issue March 7 honoring Herman Melville and the whaling industry. The commemo will feature the white whale Moby Dick from the Melville novel of the same name.

South Pacific. He was held captive for a month by the natives before escaping aboard an Australian trader from which he deserted at Papeete, Tahiti.

After working as a field laborer in Tahiti he shipped to Honolulu where, in 1948, he enlisted as a seaman on the U.S. Navy frigate *United States*. He

was discharged and returned to New York City in 1844, and two years later moved to Massachusetts to devote himself to writing until 1866. That year, in financial distress, he accepted appointment as inspector in the U.S. Customs House in New York. He retired in 1885 and died in 1891.

traveled with the Indians in the vast western plains of Canada. But the extent of his contribution was not fully realized until almost 200 years after his death when, in 1926, his meticulous handwritten accounts of the travels were found in the library of Dobb's Castle in Ireland.

The stamp designed by Dennis Burton of Toronto is red, blue and yellow and measures 40 by 24 mm. It was printed by three-color gravure and one-color steel engraving.

POLAR PHILATELISTS

Collectors who are interested in the postal history of the polar areas—the Arctic and the Antarctic—have joined forces in the American Society of Polar Philatelists. The society's journal is named, appropriately, "Ice Cap News" and is edited by Bernard V. Coyne. It reports monthly on polar postal activities. Data on the society may be obtained from Joseph L. Lynch, Jr., secretary, 213 Clay Drive, Pittsburgh, Pa. 15235.



GREENLAND. Engraved stamp marks 25th Anniv of Liberation.

Canada to Honor an Explorer

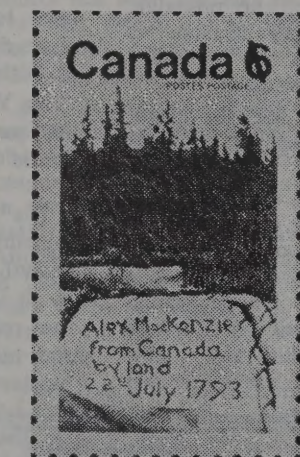
The Canadian Post Office will issue a six-cent commemorative stamp June 25 honoring Sir Alexander Mackenzie, fur trader and explorer, who in 1793 completed the first crossing of the North American continent north of Mexico.

This announcement by CPO says that the design of the six-cent stamp was taken from a Government Archives photo of the rock which he inscribed at the tidewaters of the Pacific to climax his second historic trek.

Born at Stornoway, Scotland, in 1764, Mackenzie emigrated to North America with his father in 1774. He entered the service of a fur trading company in Montreal in 1779. When the firm was later absorbed by the North West Company in 1787, Mackenzie became a partner in the

larger concern and was stationed in Athabasca.

It was during his employment there that Mackenzie embarked on his now famous explorations for the Pacific Ocean. The first of his two journeys began on June 3, 1789, and took him, by way of the Slave River and Great Slave Lake, to the Arctic Ocean and the mouth of the



river which now bears his name.

His second journey began at the forks of the Peace and Smoky rivers on May 9, 1793. Following a route along the Peace, Parsnip, Fraser, Blackwater and Bella Coola rivers, Mackenzie reached the tidewaters of the Pacific by July. There, on a large rock in Dean Channel, he left the famous inscription: "Alex Mackenzie, from Canada, by land, 22nd July 1793".



Henry Kelsey, first explorer of Canada's western plains, will be honored on the 300th anniversary of his birth with a 6-cent commemorative to be issued April 15.

When he was about 14, Kelsey was apprenticed in England to the Hudson's Bay Company and set sail the following year for Hudson Bay. Then for 40 years, as an agent of the company opening new avenues of trade, he lived and

French Antarctic Added Three On December 21

On December 21 the French Southern and Antarctic territories released 15, 100 and 500 franc values, Theodore Champion, Paris, France has reported.

Designs are, respectively, Orque-Crozet Islands, Map of Kerguelen Islands, and T.A.A.F. Armorial Bearings.

No designer or printing information was released by Champion.



DR. ALFRED GROSS, ORNITHOLOGIST, 87

Bowdoin Biologist, Member
of Arctic Expedition, Dies

The New York Times

GREENWICH, Conn., May 9 —Dr. Alfred O. Gross, a retired member of the Bowdoin College faculty and an expert on birds and wildlife, died in Greenwich Hospital Saturday. He was 87 years old.

Dr. Gross had served at Bowdoin for 41 years. When he retired in 1953 the college's governing board elected him professor emeritus of biology and Josiah Little Professor Emeritus of natural science.

He was a native of Atwood, Ill., and received his B.A. degree at the University of Illinois. He was awarded his Ph.D. at Harvard in 1912. Bowdoin gave him an honorary doctor of science degree in 1952.

He had written 265 articles and books and was a fellow and patron of the American Ornithologists Union, the highest honors awarded by the organization.

In 1934 he served as ornithologist on an Arctic expedition with the well-known explorer, Adm. Donald B. MacMillan. A new bird, found in Mexico, was named in honor of Dr. Gross, and Dr. Olin S. Pettingill Jr. dedicated his "Manual of Ornithology" to Dr. Gross. A trail in a Panama jungle, which he explored with Arthur Thornton Burgess, was named for Dr. Gross, as was an island off Baffin Island.

Col. Ashley C. McKinley, Byrd Flight Photographer

Feb. 13

Col. Ashley C. McKinley, who was a photographer on Adm. Richard E. Byrd's flights over the South Pole in 1928 and 1929, died Wednesday at Morton F. Plant Hospital, Clearwater, Fla. The retired Army officer was 73 years old and lived in Belleair, Fla.

Colonel McKinley, who was a captain at the time of the Byrd flights, invented pneumatic aircraft floats. He received a Legion of Merit citation for his services with the Army Air Forces in the 1940's in connection with the testing and development of equipment to operate in cold weather.

Survivors include his widow, the former Grace Houser, and a sister, Mrs. Faris Laswell.

Adm. Richard Cruzen, 72, Dies; Led Pioneering Polar Cruises

SAN CLEMENTE, Calif., April 16 (AP)—Retired Vice Adm. Richard L. Cruzen, who commanded pioneering cruises in both Arctic and antarctic waters during a 35-year Navy career, died yesterday at the age of 72.

Admiral Cruzen, who had lived here since retiring in 1954, was at a hospital at nearby Camp Pendleton.

Historic Voyage

Born in Kansas City, Mo., Admiral Cruzen graduated from the United States Naval Academy in 1919 and was commissioned an ensign. He had risen to the rank of lieutenant commander when, in 1939, he served as second in command to Rear Adm. Richard E. Byrd aboard the U.S.S. Bear on her historic voyage to the Antarctic.

The Government-financed expedition, in search of geographical and scientific data, took the crew into the stormy belt of icebergs and floes that encircle the polar continent. Covering a total of 24,500 miles from Boston to Antarctica, Admiral Cruzen steered the Bear through hazardous conditions

that made it impossible to drop anchor for much of the voyage.

The expedition, which included 125 men, established two bases in Antarctica, one in the vicinity of Little America, where Byrd had encamped on two previous visits, the other 1,500 miles to the east of Palmer Land. Admiral Cruzen was with the expedition for two years.

Commended by Navy Secretary Frank Knox for "superior seamanship, courage . . . and good judgment," Admiral Cruzen was later given a Legion of Merit award for his role as operations officer with the Seventh Fleet in the Southwest Pacific during World War II.

Sailing in August of 1945, Admiral Cruzen headed a four-month cruise in Arctic waters to learn more about navigational and weather conditions there. The following year he set sail for the Antarctic, this time as Task Force Commander under Admiral Byrd to test ships and equipment in cold waters.

His last duty was as commander of Navy forces in the Philippines.

He is survived by his widow, Margaret, and a daughter.

G. William Holmes Dies; U.S. Glacier Geologist

WASHINGTON, Jan. 9 —

G. William Holmes, 47, a geologist with the U.S. Geological Survey who helped establish a Northeastern Alaska center for the study of active glaciers, died Wednesday after becoming ill at his home, 303 Forest Court, Severna Park, Md. The cause of death has not been determined.

An eminent geologist in the field of glacial geology and geomorphology Mr. Holmes began his studies of glaciers while working for the Air Force. He made studies on the Greenland ice cap, and in 1955, after transferring to the Geological Survey, was assigned to Big Delta, Alaska, for a year-round study of geology and terrain conditions in the Alaska Range.

After that assignment he helped establish the Lake Peters, Alaska, research station in 1958. The center, which is still maintained by the Arctic Research Laboratory of Point Barrow, is for the study of active glaciers, glacier-fed Arctic

lakes, and recently formed glacial deposits.

Mr. Holmes also had studied glacial geology in Norway and had done mapping and topical studies in New England.

He was the author or co-author of more than 40 scientific publications and was a fellow of the Geological Society of America. He also belonged to the Arctic Institute of North America and the British Glaciological Society.

He was graduated from Carleton College in Minnesota in 1943 and was a B-17 pilot in the Army Air Force during World War II.

In 1949 he received a Ph.D. from Harvard University and for two years was chairman of the Beloit (Wis.) College geology department. Mr. Holmes' earliest work was on the geology of Early Man sites in Wyoming.

Besides his wife, Sheila, he leaves a son, Mark; two daughters, Meredith and Laurie, and a brother, James, of Cedar Rapids, Iowa.

DAVID IRWIN, 60, ARCTIC EXPLORER

Survivor of 2,000-Mile Trip
Made Alone in '35 Dies

David Irwin, who survived a 2,000-mile trip alone across the Arctic in 1935, died June 18 after a brief illness at his home in Scotrun, Pa. He was 60 years old.

Mr. Irwin made worldwide headlines when he survived a six-month trek across the Arctic alone to satisfy a consuming need for adventure.

He began the journey in 1933 by joining a company that took a reindeer herd across North America into the Eastern Arctic to supply food for the Eskimos.

Tiring of the slow pace of the herd, Mr. Irwin decided to go from Aklavik in the northernmost Yukon heading east, on his own, prospecting on the way. Most of his time, however, was spent foraging for food for himself and his starving dogs. He was discovered, near death, by Eskimos and rescued.

Born in Sarcosie, Mo., he grew up in Grand Rapids, Mich., with an interest in the North country. At 17, he ran away from home and traveled around the world by freighter twice before he was 21.

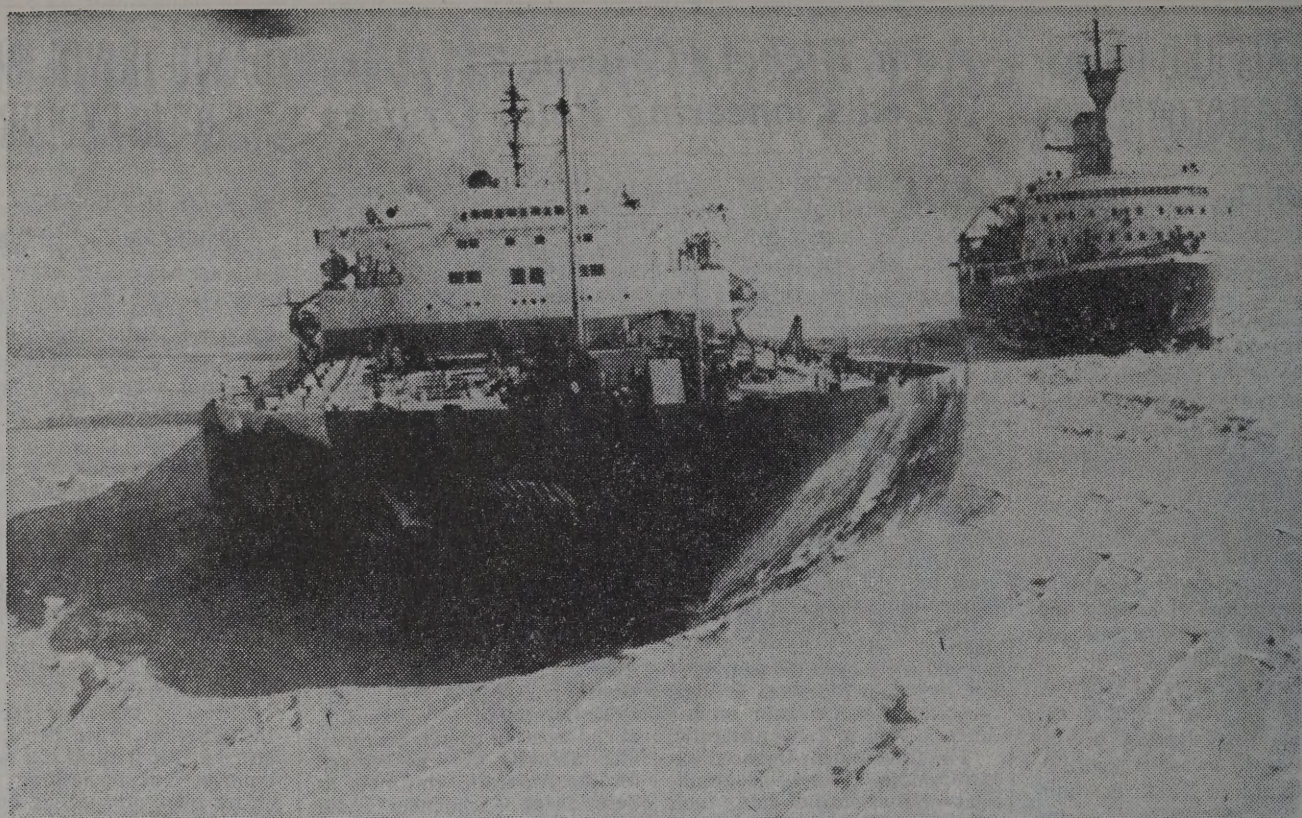
After he had returned a hero to Sarcosie, Mr. Irwin assisted in the writing of two books between 1936 and 1940. They were "Alone Across the Top of the World," and "One Man Against the North" both were written by Jack O'Brien, a surveyor for the Byrd Antarctic Expedition.

In 1940, Mr. Irwin received a special request from the Army to install weather stations on Baffin Island in the Canadian Arctic. He was commissioned a lieutenant and during his stay in the Army became a captain. He also started a project of parachuting dogs into Alaska for rescue missions.

Mr. Irwin married Margaret Tracy in 1939, and the following year they moved to Scotrun in the Poconos where they have maintained a thriving business by raising husky dogs. He remained there until his death.

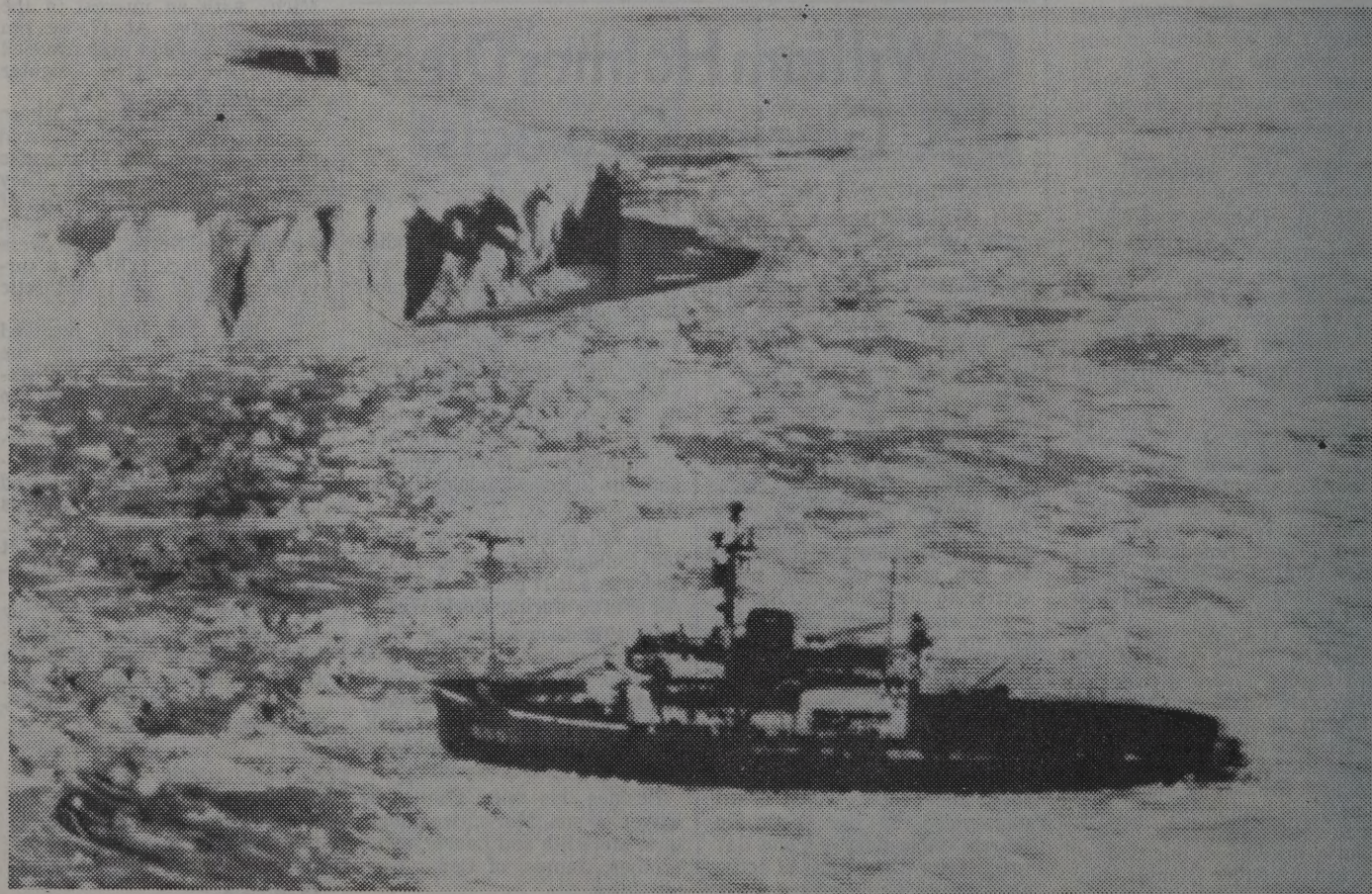
He also leaves a son, Zachary.

Americans monopolized the world's whaling industry during the 18th and 19th centuries, according to the Encyclopaedia Britannica.



BREAKING THE ICE — Humble Oil's icebreaking tanker, the SS Manhattan, left, and the Canadian Transport Ministry's newest icebreaker, the Louis S. St. Laurent, chew passage through the ice of Baffin Bay. The

United Press International Telephone trip was the second Arctic voyage for the Manhattan, which was collecting data to determine the feasibility of transporting Alaskan oil to the U.S. East Coast.



STRANDED JAPANESE ICEBREAKER, Fuji, lying amid pack ice off Norwegian Antarctica, her right propeller disabled.